

# “Basket” mattress suture to manage positive vitreous pressure during penetrating keratoplasty



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**Objective:** To describe a new/modified technique to manage posterior vitreous pressure (PVP) during penetrating keratoplasty (PKP) and report a small series.

**Design:** Retrospective interventional case series and technique description.

**Participants:** PKP eyes necessitating mattress suture placement owing to PVP.

**Methods:** Retrospective chart review from 2016 to 2019 was undertaken. Placed prophylactically (before trephination) or after trephination, the mattress suture is placed limbus-to-limbus across the anterior chamber. A second mattress suture can be placed in the opposite meridian (perpendicularly) for added support (safety basket configuration). Variations of suture technique are described based on lens status (i.e., phakic, pseudophakic, aphakic) and intraoperative timing. Parameters assessed included demographics, lens status, suture indications, intraoperative technique details, successful PKP completion, and presence of primary failure.

**Results:** There were 6 phakic eyes (5 patients) and 9 pseudophakic/aphakic eyes (8 patients). Indications for the phakic subgroup were obesity (83%), poor scleral rigidity (83%), repeated iris prolapse (67%), dense mature cataract (33%), and planned large-diameter PKP (33%). Indications for pseudophakic/aphakic eyes included intraocular lens/iris prolapse (100%), pre-existing iris defects (67%), and planned large-diameter PKP (33%). Successful PKP was performed in all cases. Whereas one case had residual corneal edema in the setting of a persistent epithelial defect owing to limbal stem cell deficiency, all other cases demonstrated no primary graft failure.

**Conclusions:** Although increased PVP can present a stressful and challenging situation, it is important to have multiple options for management. This simple mattress suture technique normalizes the lens-iris complex behaviour and appears safe for the donor graft.

**Objectif:** Décrire une technique novatrice/modifiée pour la prise en charge de la pression vitréenne postérieure (PVP) pendant la kératoplastie pénétrante (KP) et présenter une petite série de cas.

**Nature:** Étude rétrospective d'intervention d'une série de cas et description d'une technique.

**Participants:** Yeux chez lesquels on a dû utiliser un point de matelassier pendant la KP en raison d'une PVP.

**Méthodes:** On a procédé à un examen rétrospectif des dossiers médicaux de 2016 à 2019. Utilisé à titre préventif (avant la tréphinage) ou après celle-ci, le point de matelassier est réalisé de limbe à limbe à travers la chambre antérieure. On peut réaliser un deuxième point de matelassier dans le méridien opposé (perpendiculairement) pour obtenir une meilleure résistance (suture de type *safety-basket*). Les variations de la technique de suture sont décrites en fonction de l'état du cristallin (phaque, pseudophaque, aphaque) et du moment où la suture a été réalisée pendant l'intervention. Parmi les paramètres évalués, citons les données démographiques, l'état du cristallin, les indications de suture, les détails de la technique intraopératoire, la réussite de la KP et la survenue d'un échec primaire de la greffe.

**Résultats:** On a recensé 6 yeux phaques (5 patients) et 9 yeux pseudophaques/aphaques (8 patients). Les indications dans le sous-groupe « yeux phaques » étaient l'obésité (83 %), une rigidité sclérale médiocre (83 %), les prolapsus répétitifs de l'iris (67 %), la présence d'une cataracte mature (33 %) et une KP de grand diamètre planifiée (33 %). Les indications dans le sous-groupe « yeux pseudophaques/aphaques » étaient le prolapsus de la lentille intraoculaire ou de l'iris (100 %), la présence de défauts préexistants de l'iris (67 %) et une KP de grand diamètre planifiée (33 %). La KP a été réussie dans tous les cas. En dépit d'un œdème cornéen résiduel en présence d'un défaut épithélial persistant imputable à une carence en cellules souches limbiques chez un patient, il ne s'est produit aucun échec primaire de la greffe.

**Conclusions:** Bien que l'augmentation de la PVP puisse engendrer stress et difficultés, il est d'important de disposer de plusieurs options de prise en charge. Technique de suture toute simple, le point de matelassier permet de ramener à la normale le comportement complexe du duo lentille-iris et semble sans danger pour le greffon.

Positive vitreous pressure (PVP) may be encountered during ocular surgery especially when the eye is open with prolonged ocular hypotony (e.g., penetrating keratoplasty [PKP], repair of anterior open globe injuries, and traditional extracapsular cataract extraction [ECCE]).<sup>1-6</sup> Characterized by forward displacement of the lens-iris diaphragm, additional signs may be seen, such as anterior chamber shallowing often resistant to reformation, repeated iris prolapse, zonular rupture, posterior capsule bulging forward or rupture during ECCE, vitreous prolapse, lens prolapse, and expulsive hemorrhage.<sup>5,6</sup>

Prevention of PVP is the best management during intraocular surgery.<sup>7,8</sup> Both mechanical techniques and pharmacologic means may be used preoperatively or intraoperatively to reduce vitreous pressure. Although preoperative planning, rapid wound closure, and ophthalmic viscoelastic device (OVD) use are often effective in the management of increased posterior pressure during most anterior segment procedures, PKP can present additional difficulties given the large open wound size and resulting longer time necessary to close this system.

In general, it is important to inspect the patient's head/body position, eye speculum, and other potential instruments putting external compression on the scleral wall. Ensuring complete akinesia with retrobulbar block (facial nerve block, if blepharospasm is an issue), using a Honan balloon, maintaining paralysis with general anaesthesia, and administering mannitol preoperatively are pharmacologic ways to minimize increased vitreous pressure. Practices such as placing a scleral support ring (i.e., Flieringa) can be quite common while vitreous aspiration is typically used as a last resort.<sup>5,9</sup> Methods to hold back the intraocular lens (IOL) and iris using needles, wires, or sutures across anterior chamber limbus to limbus have also been described.<sup>7,8,10</sup> The current study reviewed our use of a limbus-to-limbus mattress suture for patients having PKP with high PVP despite the above preoperative measures. We also describe variations of this suture technique based on lens status (i.e., phakic, pseudophakic, aphakic).

## Methods

This study is a retrospective chart review of patients seen at CVP (encompassing Virginia Eye Consultants, Norfolk, VA, and Cincinnati Eye Institute, Edgewood, KY) and Rosedale Medical Centre/University of Toronto, Toronto, Ont., between 2016 and 2019. This study was conducted according to protocols approved by the Eastern Virginia Medical School Institutional Review Board (Norfolk, VA), University of Cincinnati Institutional Review Board (Cincinnati, OH), and University of Toronto Institutional Review Board (Toronto, Ont.). The protocol and methods

used also complied with the standards set forth by the Declaration of Helsinki. All procedures were performed by 3 surgeons (A.Y.C., C.C.C., E.J.H.). Informed consent was obtained from all patients preoperatively. Inclusion criteria included all patients (i) undergoing a PKP that (ii) required a limbus-to-limbus mattress suture to (iii) manage PVP.

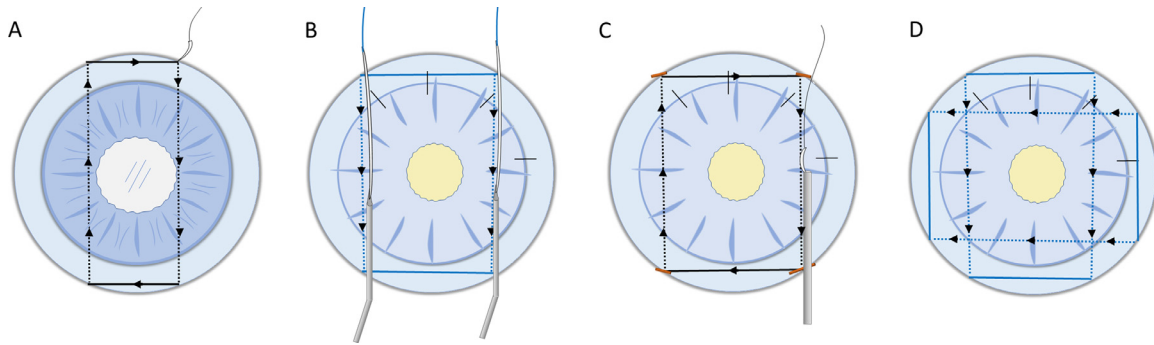
The parameters assessed included demographics, lens status (phakic, pseudophakic, aphakic), indications for the suture (i.e., risk factors), intraoperative technique details, and presence of primary failure. The main outcome measures were achievement of successful PKP completion and identification of PVP risk factors necessitating a mattress suture. Additionally, another goal of this study was presence of primary graft failure.

**Technique** (Video 1 demonstrates technique variations, available online)

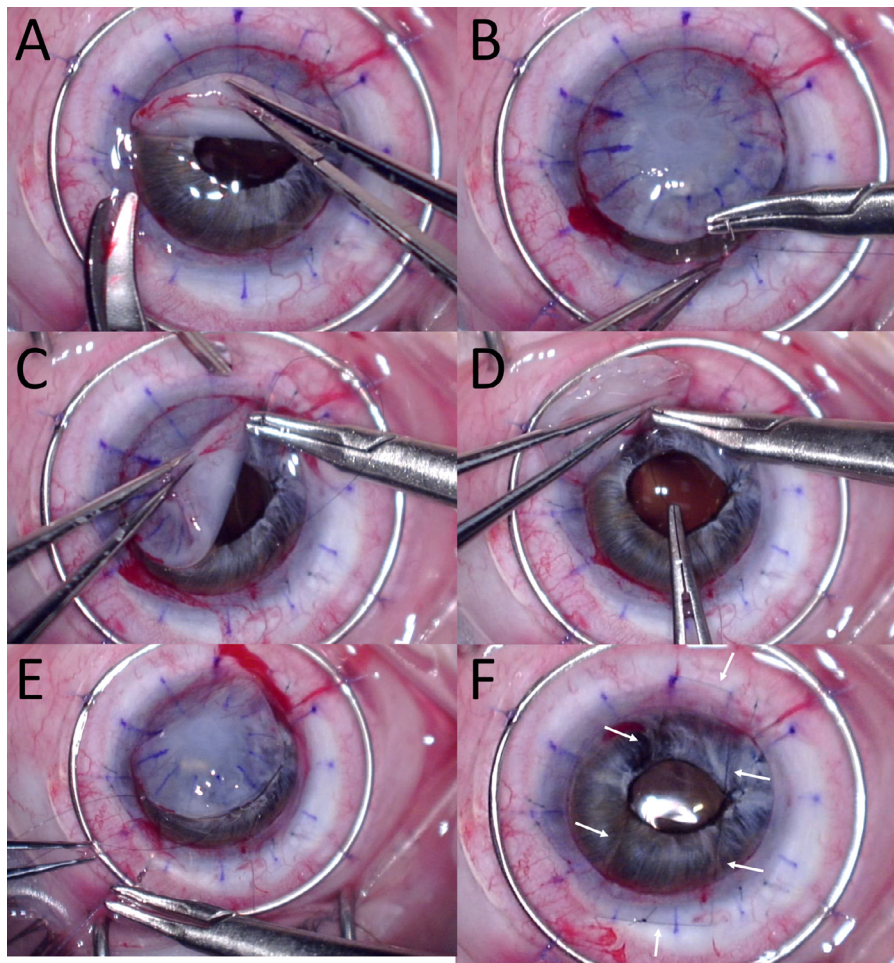
Simcoe previously described a triangular and quadrangular retaining suture positioned over the pupil and IOL to prevent touch of the IOL and the corneal endothelium.<sup>10</sup> We describe several quadrangular variations of this suture technique based on lens status and whether the suture is placed prophylactically (before trephination) or after corneal trephination. General prophylactic practices to manage increased PVP should be taken, including administering a small volume subtenons/retrobulbar block and/or facial block, placing the patient in reverse Trendelenburg position, and suturing a Flieringa ring to provide additional sclera rigidity.

## Pseudophakic/Aphakic Eyes

In pseudophakic or aphakic eyes, we perform a similar quadrangular mattress suture as Simcoe previously described with 10-0 nylon (CSM-6 needle [Ethilon, Ethicon, Cincinnati, Ohio]). Once the signs of substantial PVP are noted (e.g., IOL or iris prolapse) after a partial full-thickness recipient trephination is made, OVD is placed to help push the IOL/iris complex posteriorly. A suture is passed entering at the limbus and brought across the anterior chamber under the corneal button. The suture is then externalized and passed through the limbus on the other side of the pupil. Next, the suture is brought across the anterior chamber under the corneal button in the opposite direction as the first pass, externalized, and tied. An assistant can administer downward pressure on the IOL to help during suture placement. The width/spacing of the entry sites is less critical compared with phakic eyes as there is no consequential damage if the suture rubs temporarily against the IOL. If desired, a second mattress suture can be constructed perpendicularly (opposite meridian) to create a safety basket configuration. [Figure 1A](#) demonstrates a schematic diagram; [Figure 2](#) highlights an



**Fig. 1**—Schematic diagram demonstrating the placement of the quadrangular mattress suture in a pseudophakic eye (A). It is drawn across the open sky anterior chamber (dotted black lines), externalized (solid black lines), drawn across the anterior chamber in the opposite direction, externalized, and tied to form the quadrangular shape. Note that the suture can be close to the pupil given the pseudophakic state. (B) and (C) are for phakic eyes and are performed in a closed system after resuturing the wound if post-trephination; note that the suture is at least 1–2 mm peripheral to the pupil edge. (B) is a schematic diagram demonstrating a double-armed needles brought across the anterior chamber with a needle docking technique using a bent 27-gauge needle. This is tied to form the quadrangular mattress suture. (C) shows a similar pattern as (A) but in a closed system with paracenteses (orange lines). The needle is guarded by a 27-gauge ophthalmic viscoelastic device or anterior chamber cannula, brought across the anterior chamber, externalized in a pattern similar to (A), and finally tied. (D) demonstrates how a second mattress suture can be created in the opposite meridian to construct a safety basket configuration for added support.



**Fig. 2**—Intraoperative still photographs demonstrating significant posterior vitreous pressure after trephination and corneal removal (A) in a pseudophakic eye. A 10-0 nylon suture is passed at the limbus (B), drawn across the anterior chamber, passed through the limbus to externalize the suture (C), passed in the opposite direction (D) through the limbus (note an assistant places downward pressure on the intraocular lens to help with suture passage), externalized across the anterior chamber (E), and tied (F).

intraoperative example. Of note, this technique can be used to manage iris prolapse, but it will not address any vitreous prolapse associated in an aphakic eye.

### Phakic Eyes

There are certain liberties that are afforded in the setting of pseudophakic eyes that are not available in phakic eyes as there may be risk of lens/capsule damage. Additionally, manipulation with downward pressure on the IOL/iris by an assistant cannot be safely performed in a phakic eye (i.e., potential for lens capsule tear, cataract formation).

Once the decision is made that a mattress suture is necessary upon trephination or corneal button removal, re-creating a closed system is first performed by closing the PKP wound with interrupted sutures to minimize iris-lens prolapse. Intracameral miocchol (Miocchol-E, Bausch & Lomb, Laval, Que.) can be administered if preoperative topical pilocarpine (generic 1% or 2% ophthalmic solution) was not sufficient for constriction. While miocchol can pull the iris-lens diaphragm forward and shallow a closed anterior chamber, the constricted pupil can act as a barrier to hold back the lens/IOL in an open system. The additional iris surface area also decreases the likelihood of the mattress suture chafing the lens capsule. OVD is then used to maintain a formed anterior chamber. Markings are made for the positioning of the mattress suture(s). The width between each pair is approximately 1–2 mm on either side of the pupil to prevent lens touch. A double-armed 9-0 or 10-0 polypropylene with 2 long, curved needles (e.g., CIF-4 needle [Prolene, Ethicon, Cincinnati OH]) is passed on either side of the pupil. The angulation of the needle should be just above and parallel to iris plane. A needle docking technique using a bent 27-gauge needle allows the suture to pass through the anterior chamber. The bent needle is inserted halfway into the anterior chamber where the long, curved needle can be docked and brought through the opposite side. This is performed in parallel fashion and tied to create a mattress suture. [Figure 1B](#) depicts this technique.

Alternatively, paracenteses (~1 mm) are made in 4 areas (at least 1–2 mm on either side of the pupil to approximate the rectangular shape) with a 15° blade, ensuring that these are parallel to iris plane and peripheral (level of the limbus). In a needle docking manner, a 27-gauge OVD cannula or 27-gauge anterior chamber cannula can then be brought across the anterior chamber through 2 opposing paracenteses. A 10-0 nylon needle is flattened (with the needle driver or hemostat) and inserted in the cannula. It is brought across the anterior chamber guarded by the cannula to protect both the lens and iris. A similar process is performed through the other 2 paracenteses in the opposite direction. Then this is tied to form a horizontal mattress suture (see [Figs. 1C and 3](#)). If it is difficult to fully bring the cannula across both paracenteses based on the position of the eye, the eye may need to be rotated (typically by the Flieringa ring) to help passage of the cannula through the 2 paracenteses. The same procedure can be repeated in the opposite meridian (perpendicular) to create a safety basket configuration ([Fig. 1D](#)).

### Prophylactic Suture Placement

If PVP is anticipated (e.g., if the other eye demonstrated significant PVP or there are multiple risk factors; see [Table 1](#)), a mattress/basket suture may be applied prophylactically before corneal trephination (while the globe is closed). The same steps are followed as with phakic eyes without the step of closing the open trephination with interrupted sutures. A double-armed long needle may be used to create the mattress suture by entering the cornea at the level of limbus. The longer needle allows the suture to be brought across the anterior chamber in the closed system. We often use a needle docking technique with the long needle, especially in phakic eyes, to minimize risk of lens injury. Alternatively, the same mattress suture can be fashioned (as above) with 10-0 nylon through paracenteses, guarded by a cannula. The same procedure can be repeated in the opposite meridian (perpendicular) to create a safety basket configuration ([Fig. 4](#)).

### Corneal Transplantation Resumed

The corneal button can then be fully removed. The lens-iris complex often behaves similar to a standard keratoplasty once it is held back by the mattress suture(s). Generous OVD is placed over the sutures and perilimbal area. The donor corneal button is brought onto the field and sutured into place. Once eight sutures are placed, the mattress suture may be cut, and the remaining PKP sutures are placed.

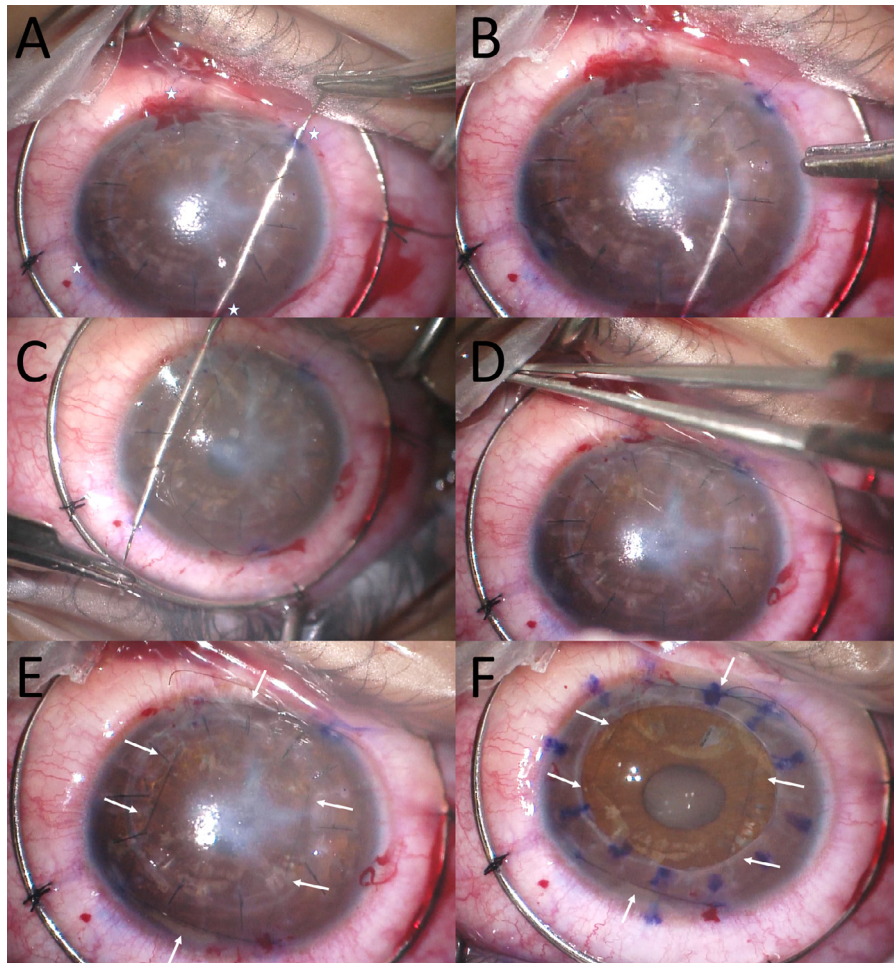
### Retrospective Review

There were 15 PKP eyes/cases of 13 patients where increased PVP was managed with a mattress suture. None of these cases were combined with concurrent cataract surgery. Lens status, associated risk factors, intraoperative technique, and outcome details for all eyes are listed in [Table 2](#).

There were 6 eyes of 5 patients (mean age 38.7 years) that were phakic. Common risk factors or indications necessitating the technique ([Table 3](#)) were obesity (high body mass index [BMI]) often with being barrel chested (83%), poor scleral rigidity (keratoconus, 83%), repeated iris prolapse after trephination (or history of, 67%), dense mature cataract (33%), and planned large-diameter PKP (33%). The mattress suture was used prophylactically in 3 cases and after trephination in 3 cases.

There were 9 eyes of 8 patients (mean age 45.8 years) that were pseudophakic or aphakic. Common risk factors or indications necessitating the technique included IOL or iris prolapse (100%), pre-existing iris defects (67%), and planned large-diameter PKP (33%). The mattress suture was used prophylactically in 5 cases and after trephination in 4 cases.

Successful PKP was performed in all cases while the suture held back the iris-lens diaphragm without damage to ocular structures. There was one case with residual corneal edema in the setting a persistent epithelial defect owing to limbal stem



**Fig. 3—**Intraoperative still photographs demonstrating safety basket mattress suture in a phakic eye. Markings are made for the positioning of the basket sutures; the width between each dot pair is at least 1–2 mm on either side of the pupil to prevent lens touch (A). A double-armed 9-0 polypropylene with 2 long, curved needles is passed in the horizontal meridian above and below the pupil (B–E) with a needle docking technique using a bent needle. This is tied (F). The same procedure is repeated in the vertical meridian (G, arrows highlight the externalized sutures). (H) demonstrates the safety basket configuration after corneal button removal with the 2 perpendicular mattress sutures (dotted lines).

cell deficiency; it was difficult to determine if this was primary graft failure or simply owing to the persistent epithelial defect. In all the other cases, the grafts cleared with no primary graft failure. For phakic eyes, there was no accelerated cataract formation after PKP; of note, 2 eyes already had mature cataracts preoperatively. During the mean follow-up of 8.1 months (range 1–20 months), there was one case of immunologic graft rejection (secondary to poor medication adherence) that was successfully treated with increased topical corticosteroids.

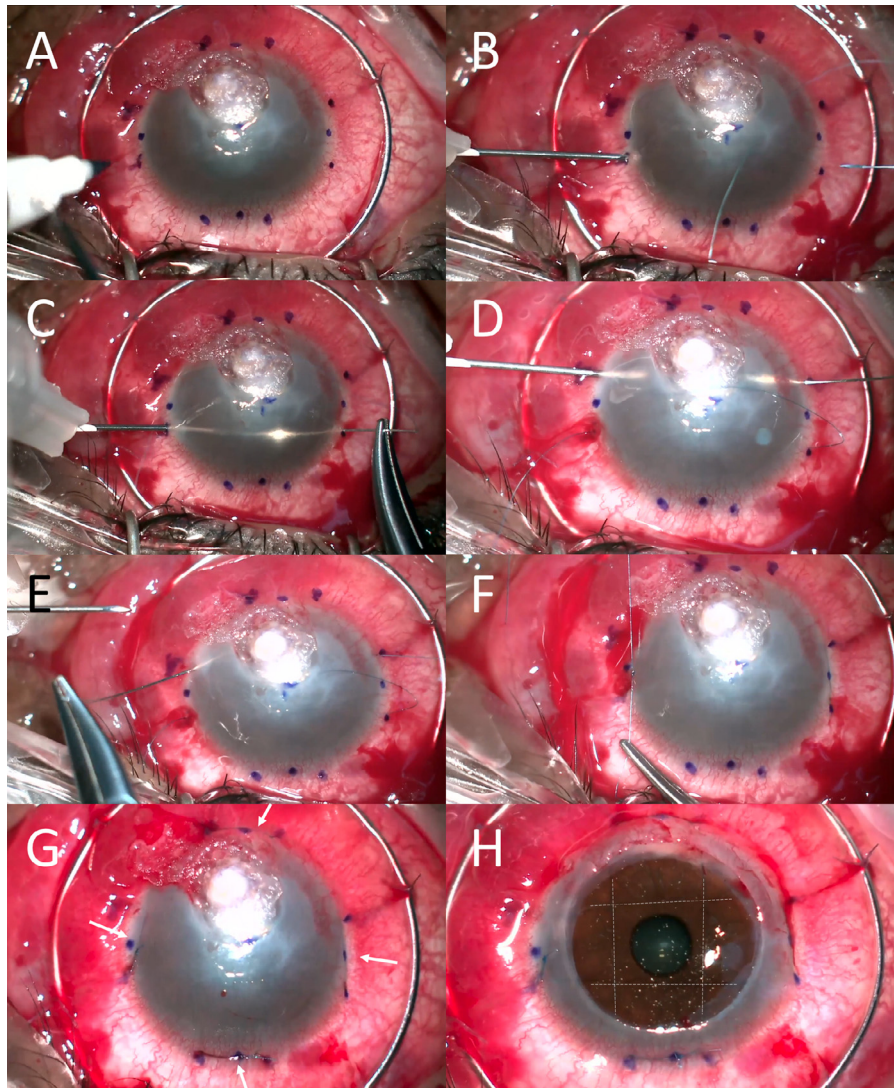
## Discussion

Although PVP is often best managed by preoperative preventative measures, it is valuable to know several techniques to manage significant iris and lens prolapse intraoperatively during PKP.<sup>7</sup> Options include a retaining suture,<sup>10</sup> simple downward pressure on the IOL by an assistant, double-needle technique,<sup>8,11</sup> lamellar technique,<sup>12</sup> graft-over-host technique,<sup>13</sup> core vitrectomy,<sup>14</sup> or vitreous aspiration.<sup>5,9</sup> Many of

these techniques may be limited to pseudophakic eyes and older patients. In our pseudophakic patients, we use the quadrangular mattress suture with 10-0 nylon suture after trephination as previously described by Simcoe. Although Simcoe described leaving this suture postoperatively and

**Table 1—Risk factors for increased posterior vitreous pressure during penetrating keratoplasty**

Risk Factors
Patient habitus: obesity, barrel chested, tall
Obstructive sleep apnea, chronic obstructive pulmonary disease
Young age (i.e., formed vitreous)
Poor scleral rigidity (e.g., keratoconus, high myopia, buphthalmos)
Small orbit
Strong blink reflex
Unstable intraocular lens or weak zonules
Pre-existing iris defects (e.g., large pupil from prior trauma or surgery, peripheral anterior synechiae, aniridia)
Orbital pressure (e.g., thyroid eye disease, orbital neoplasm, orbital fat)
Shallow anterior chamber
Dense mature cataract
Planned large-diameter penetrating keratoplasty
Anxiety



**Fig. 4—**Intraoperative still photographs demonstrating a variant quadrangular mattress suture placement in a phakic eye. Limbal paracenteses are noted with stars. An ophthalmic viscoelastic device (OVD) cannula is placed across the anterior chamber and a 10-0 nylon needle is docked (A). The docked needle is brought across the anterior chamber (B) and externalized. The OVD cannula is brought in the opposite direction across the anterior chamber and again docked with the needle (C). This is externalized, and the suture is tied (D). Arrows in (E) identify the suture in the anterior chamber and along the limbus. Once the cornea is removed, the suture holds back the iris-lens complex with posterior vitreous pressure (F).

removed it at the slit lamp,<sup>10</sup> we remove these sutures once the PKP graft is secured. Unique from other reports, we present a variation of this technique for phakic eyes that can be used prophylactically in high-risk patients with either 9-0/10-0 polypropylene (on a long needle) or 10-0 nylon. This basket/mattress suture is similar to the safety basket techniques presented for other indications, including malpositioned posterior chamber IOLs,<sup>15</sup> endothelial keratoplasty in high-risk eyes,<sup>16,17</sup> and silicone oil in aphakic eyes.<sup>18</sup>

Certain precautions are necessary when managing PVP in the setting of a natural lens to avoid cataract formation and damage to the lens capsule. First, the anterior chamber is reformed with OVD to reduce anterior movement of the lens so that trauma is minimized as the needle is brought across the anterior chamber. Next, it is useful to guard the

needle with a docking technique using a bent needle or a cannula. Finally, wide placement of the paracenteses (at least 1–2 mm peripheral to the pupil) can minimize the chance of lens damage. Conversely, other retaining sutures or needles placed across the anterior chamber in the pseudophakic eye are often placed intentionally over the IOL.

Although there are other techniques to manage PVP, many have disadvantages. Both the lamellar technique and the graft-over-host technique expose the endothelial cells to trauma despite a layer of dispersive OVD for protection.<sup>12,13</sup> Although there is the potential for contact between the suture and endothelial cells after mattress suture placement, any contact would be minimal (much less than the other described techniques), and the anteriorly displaced iris (coming around the suture) from PVP is likely to

**Table 2—Lens status, associated risk factors, technique, and outcome details for series**

Eye/Case No.	Diagnosis	Lens Status	Risk Factors or Indications Requiring Suture	Intraoperative Timing (Prophylactic vs After Trephination)	Suture Technique	Successful PKP Completion	Primary Failure	Complications (i.e., Iris or IOL/Lens Damage, Vitreous Loss)
1	Keratoconus, corneal scar (prior hydrops)	Phakic	BMI 54.6, iris prolapse	After trephination	10-0 nylon guarded by cannula	Yes	No	None*
2	Keratoconus, corneal scar	Phakic	BMI 54.6, iris prolapse with contralateral eye	After trephination	10-0 nylon guarded by cannula	Yes	No	None
3	Keratoconus, failed graft	Phakic	BMI 80.6, iris prolapse with prior PKP, large-diameter PKP planned, dense intumescent cataract	Prophylactic	10-0 nylon guarded by cannula	Yes	No	None
4	Keratoconus, corneal scar (prior hydrops)	Phakic	BMI 43.9, iris prolapse	After trephination	10-0 nylon guarded by cannula	Yes	No	None
5	Keratoconus, corneal perforation	Phakic	BMI 36.6, large-diameter PKP planned	Prophylactic	Double-armed 9-0 polypropylene guarded by docking needle	Yes	No	None
6	Corneal scar	Phakic	Dense mature cataract	Prophylactic	Double-armed 9-0 polypropylene guarded by docking needle	Yes	No	None
7	Corneal scar, LSCD	Pseudophakic	IOL prolapse, large iris defect s/p repair	After trephination	10-0 nylon, open sky	Yes	No	None
8	Corneal scar, LSCD, failed graft	Pseudophakic	IOL prolapse, large iris defect s/p repair	After trephination	10-0 nylon, open sky	Yes	No	None
9	Pseudophakic bullous keratopathy, opaque cornea	Pseudophakic	IOL prolapse, large pupil secondary to 360° PAS	After trephination	10-0 nylon, open sky	Yes	No	None
10	Corneal scar	Pseudophakic	IOL prolapse	Prophylactic	Double-armed 10-0 polypropylene	Yes	No	None
11	Corneal scar	Pseudophakic	IOL prolapse	Prophylactic	Double-armed 10-0 polypropylene	Yes	No	None
12	Corneal scar, LSCD	Pseudophakic	IOL prolapse, aniridia, large-diameter PKP planned	Prophylactic	Double-armed 10-0 polypropylene	Yes	No	None
13	Corneal scar	Pseudophakic	IOL prolapse, sulcus IOL with overlying iris atrophy/ defects, large-diameter PKP planned	Prophylactic	Double-armed 10-0 polypropylene	Yes	No	None
14	Corneal scar, LSCD, failed graft	Pseudophakic	IOL prolapse, iris atrophy/ defects	Prophylactic	Double-armed 10-0 polypropylene	Yes	Indeterminate <sup>†</sup>	None
15	Corneal scar	Aphakic	Iris prolapse	After trephination	10-0 nylon, open sky	Yes	No	None

LSCD, limbal stem cell deficiency; PAS, peripheral anterior synechiae; IOL, intraocular lens; PKP, penetrating keratoplasty.

\*Residual iris atrophy from iris prolapsed into corneal button junction after trephination from PVP, but not from mattress suture.

<sup>†</sup>Edema present in setting of persistent epithelial defect from limbal stem cell deficiency.

**Table 3—Identified risk factors and indications for basket/mattress suture during penetrating keratoplasty**

Lens Status	Risk Factors and Indications
Phakic	Obesity, barrel chested Poor scleral rigidity (e.g., keratoconus, high myopia) Repeated iris prolapse after trephination (or history during prior keratoplasty or with contralateral eye) Dense mature cataract Planned large-diameter PKP
Pseudophakic	IOL or iris prolapse Pre-existing iris defects (e.g., large pupil from prior trauma or surgery, peripheral anterior synechiae, aniridia) Planned large-diameter PKP

IOL, intraocular lens; PKP, penetrating keratoplasty.

be in greater contact with the endothelium. Aspiration of the vitreous and vitrectomy may pose certain risks to the retina especially in young patients (mean age was 42.3 years for all patients in this study) where the vitreous has not yet liquified. In the hands of anterior segment/corneal surgeons who do not regularly perform vitrectomies, this simple suture technique may afford less risk.

In general, this technique does not take much additional time, especially if considered prophylactically and done before trephination. There may be minimal added time required for closing the PKP wound to create a closed system if this is considered in a phakic eye after trephination. It should be noted that most of the other techniques will also require significant (if not more) unanticipated surgical time. Although the technique using 2 translimbal fixation needles across the anterior chamber may be faster,<sup>8,11</sup> there is likely less trauma with our technique to the donor endothelium if the anterior chamber shallows or flattens during suturing of the graft.

Using the double-armed long needles (i.e., 10-0 polypropylene on a CIF-4 needle) in a docking technique does appear to be easier and faster, and this would be our first choice if these needles are available to the surgeon in a timely manner. Although we have found that 1 mattress suture can be sufficient, placing 2 mattress sutures perpendicularly (in opposite meridians) in a safety basket configuration gives extra support, especially if one of the sutures inadvertently breaks during placement of the cardinal sutures. In this series, only one mattress suture was placed when the suture was necessary after trephination, and this appeared sufficient to hold back the iris-lens complex in all cases. The placement of a second mattress suture was done prophylactically (before trephination) based on the surgeon's judgement. We identified that risk factors in phakic eyes were obesity (mean BMI was 54.1 in this study) with being barrel chested, poor scleral rigidity owing to keratoconus, dense mature cataract, and planned large-diameter PKP. All pseudophakic eyes demonstrated IOL prolapse often in the setting of iris defects/abnormality (i.e., enlarged pupil increased the likelihood of IOL prolapse). We recommend considering this technique prophylactically when there are considerable risk factors for PVP.

Although increased PVP can present a stressful and challenging situation, it is important to have multiple options to

manage this. This simple mattress suture technique normalizes the lens-iris complex behaviour in cases of increased PVP and appears safe for the donor graft.

### Supplementary Materials

Supplementary material associated with this article can be found in the online version at doi:[10.1016/j.jcjo.2020.06.012](https://doi.org/10.1016/j.jcjo.2020.06.012).

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## Footnotes and Disclosure

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