

# Purse String Suturing for Post Radial Keratotomy Hyperopia

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**Abstract:** Radial keratotomy (RK) in 1980s had been considered to be a reasonable treatment for low to moderate degrees of myopia. The main complication of RK over the ensuing postoperative years has been refractive instability and progressive hyperopia. In our case report, we describe the technique of intrastromal purse string suturing using 9-0 polypropylene suture in a case of post RK high hyperopia 20 years after the initial surgery. The uncorrected distance visual acuity (UCDVA) improved from 1.1 LogMAR preoperatively to 0.3 LogMAR within one month with a significant and stable steepening on the corneal topography four months post suturing.

**Keywords:** Radial Keratotomy, Post RK Hyperopia, Purse String Sutures.

## 1. Introduction

For refractive surgeons, encountering Radial Keratotomy (RK) patients with consecutive hyperopia is a challenging situation. This may be either from a primary overcorrection or from a progressive postoperative process. We propose a method of using a 9-0 polypropylene in an intrastromal purse string suture for tackling postRK hyperopia.

## 2. Case Report

A 45 years old female presented to us with the history of both eyes Radial Keratotomy done for myopia 20 years back. She developed a gradual progressive diminution of vision two to three years following the surgery for which she was initially prescribed glasses and then contact lenses some years back. On presentation, she complained of blurred vision and inability to retain the contact lens in the left eye. The uncorrected distance visual acuity (UCDVA) in the right and left eye was 0.9 LogMAR and 1.1 LogMAR respectively improving to 0.2 LogMAR in both eyes with correction of +3.00 DS/-1.50 DC\*180 in the right and +7.00 DS/-1.50 DC\*70 in the left eye. The corneal topography showed a large centrally flat cornea with irregular astigmatism (Figure A & B). The ocular examination revealed 8 RK incisions on the cornea with clear crystalline lens and normal fundi in both the eyes. In view of the clear lens and the improper contact lens fitting, we decided to go ahead with intrastromal single purse string suturing for the left eye. Under topical anaesthesia, after marking a 6.00 mm diameter circular mark on the cornea (Figure C), the RK incisions were opened using a sinsky hook and a 9-0 polypropylene suture was passed intrastromal through the base of the incisions in circular purse string fashion (Figure D) and tied at 12 O clock position (Figure E). The patient was started on low dose steroid and antibiotic drops four times a day each, with gradual tapering of the steroid drops over the next one month. At the first month postoperative visit, the UCDVA in the left eye was 0.3 LogMAR improving to 0.2 LogMAR with a correction of +1.0 DC\*160 with a quiet eye (Figure F). The vision and subjective refraction maintained over the next three months with corneal topography done four months post suturing showing a significant steepening of the cornea (Figure G).

## 3. Discussion

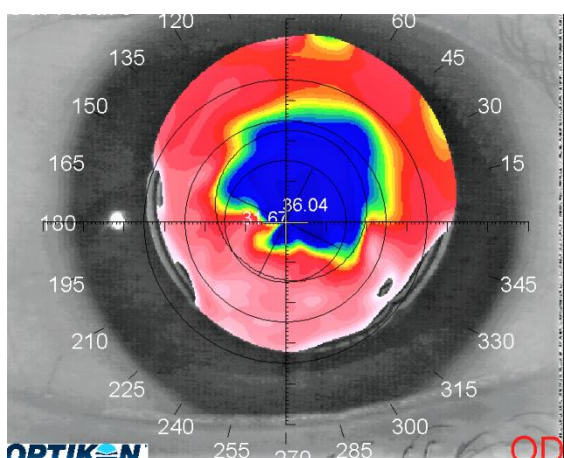
Radial keratotomy is a now obsolete refractive surgical technique of the 80s and 90s, consisting of penetrating radial anterior corneal incisions of 80-90% depth leaving an intact central area for a diameter of around 3 mm<sup>(1, 2)</sup>. Hyperopia following RK can be a significant problem, either immediately following surgery or years later probably due to the weakening of the peripheral cornea beyond a critical point caused by intraocular pressure and by years of external lid pressure from blinking, sleeping, and eye rubbing<sup>(3)</sup>. These patients usually are not happy with spectacles due to the distorted images. Simunovic et al<sup>(4)</sup> and Forister et al<sup>(5)</sup> reported the successful use of orthokeratology rigid gas permeable contact lenses (OD-RGPCL) for the correction of hyperopia following RK. However, these lenses seemed to be ineffective in the long term. Hybrid lenses have also been reported in the management<sup>(6)</sup>. Alio et al<sup>(7)</sup> reported using hybrid lenses in patients with astigmatism following refractive surgery and found it to confer good results in cases of post-RK hyperopia. There is also a report of using a plus spherical soft contact lenses to correct hyperopia and low-grade astigmatism simultaneously in post RK patients by Chen et al<sup>(8)</sup>. LASIK and PRK have been proposed to be promising having shown favorable initial outcomes in the management for post RK hyperopia<sup>(9-11)</sup>. The flap-related issues in LASIK, especially epithelial in growth and splitting RK incisions can cause flap fragmentation along with the possibility corneal ectasias<sup>(10)</sup>. Post PRK haze is also a major limitation in handling high hyperopia<sup>(11)</sup>. With regard to visual acuity correction in patients undergoing RK with hyperopic shift and presbyopia, a possible and well-tolerated solution is represented by the implantation of multifocal IOLs, as reported by Kim et al<sup>(12)</sup> and Gupta et al<sup>(13)</sup>. Nuzzi et al<sup>(14)</sup> also reported the management of post RK hyperopia with the implantation of a customized toric multifocal IOL. In spite of the encouraging results, the IOL power calculation still remains a topic of debate, and cataract surgery poses all the risks and potential complications of an intraocular procedure. The use of single<sup>(15)</sup> or double purse string suture<sup>(3)</sup> has been already proposed long back in the literature as peripheral interrupted or purse-string sutures can steepen the central cornea after radial keratotomy (RK) by causing wound and tissue compression<sup>(16)</sup>. In the study by Lyle et al

<sup>(15)</sup>, less than 0.28 D average flattening occurred over the 5 years following purse string suturing indicating this is not a temporary treatment the effect was long term. We weighed all the available options for the management in our case and went ahead with the use of a single intrastromal purse string suturing technique in our case. We have had very promising initial outcomes of significant steepening of the central cornea along with the reduction in the magnitude of the subjective refraction, without any intraoperative and post-operative complications.

**4. Conclusion**

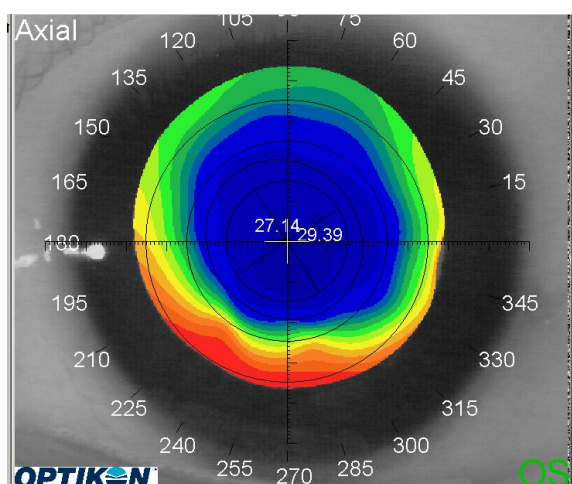
Intrastromal purse-string suturing produces significant steepening of the central cornea and is a fairly safe method to tackle hyperopia following radial keratotomy.

**5. Figures and Legends**



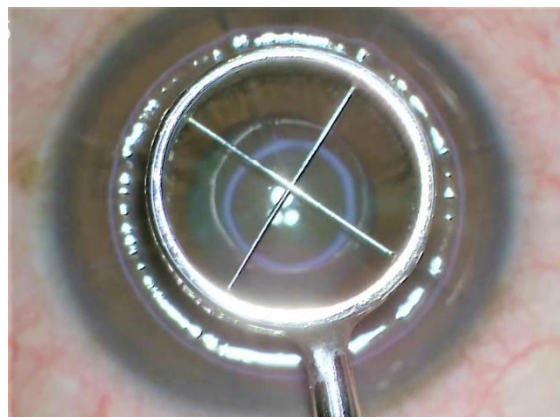
**Figure A**

Legend A: Axial map of the topography scan of the right eye cornea on presentation



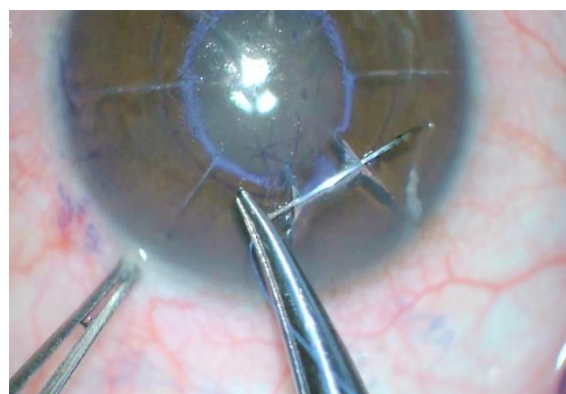
**Figure B**

Legend B: Axial map of the topography scan of the left eye cornea on presentation



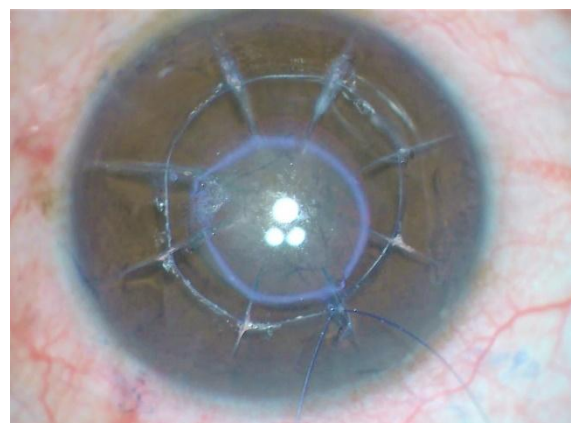
**Figure C**

Legend C: 6.00 mm marking on the cornea for the site of suture placement



**Figure D**

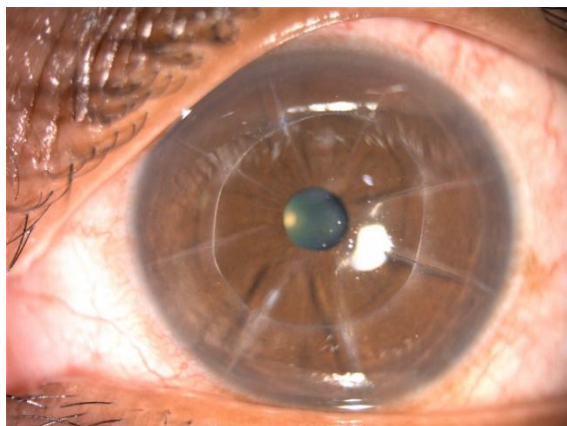
Legend D: Intrastromal passing of the 9-0 polypropylene suture between two incisions



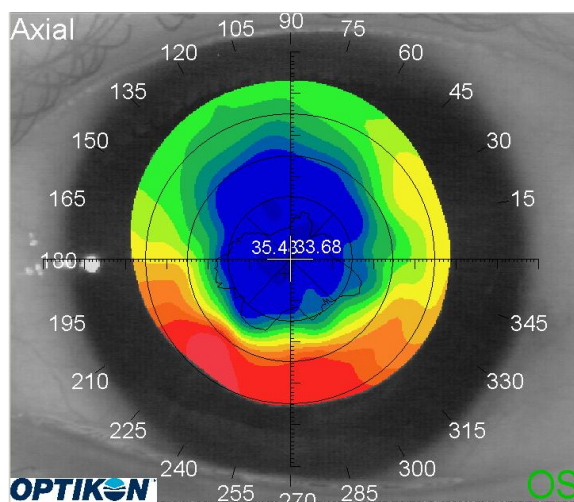
**Figure E**

Legend E: Tying and the tightening of the suture



**Figure F**

Legend F: Clinical photograph post operative 1 month

**Figure G**

Legend G: Axial map of the topography scan of the left eye cornea after 4 months of the purse string suturing

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