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Overcoming the Dual Challenge: Successful Visual Rescue in Traumatic Cataract with Adherent Leucoma

[1]Dr. Devesh Yadav*, [2]Dr. Arvind Ram, [3]Dr. Avirupa K. Banik, [4]Dr. Gunjan Sharma

[1]Resident Ophthalmology

[1]Affiliation Address: IQ City Medical College Hospital, Durgapur, West Bengal 713206

[2]Professor and Head Department of Ophthalmology

[2]Affiliation Address: IQ City Medical College Hospital, Durgapur, West Bengal 713206

[3]Associate Professor

[3]Affiliation Address: Department of Ophthalmology, IQ City Medical College Hospital, Durgapur, West Bengal 713206

[4]Resident Ophthalmology

[4]Affiliation Address: IQ City Medical College Hospital, Durgapur, West Bengal 713206

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Abstract: **Background: Traumatic cataract with adherent leucoma is among the most complex combined anterior segment injuries, typically managed with staged surgery or primary keratoplasty, which carries risks of graft rejection, steroid dependency, and delayed rehabilitation. Non-keratoplasty reconstruction of this combination remains rare, reported only in isolated cases.**

Case Description: Penetrating trauma in a 48-year-old man with hand-movement vision, adherent leucoma with iris incarceration, an inferiorly distorted pupil, dense mature cataract, and a shallow, asymmetrical anterior chamber.

Management: Instead of primary keratoplasty, four interdependent steps were combined in a single procedure while sparing the stable, non-central scar: synechiolysis, iris-hook stabilisation, capsular-tension-ring-supported small-incision cataract surgery, and in-the-bag IOL implantation with McCannel pupilloplasty.

Outcome: At day 7, the BCVA had increased to hand movements, at 1 month to 6/12, and remained stable at 6/12 at 3 months, without any recurrent synechiae or complications.

Conclusion: In selecting patients, particularly where resources and donor tissue are limited, this case demonstrates a cornea-sparing alternative to staged or keratoplasty-based management.

Keywords: **Traumatic cataract, adherent leucoma, cataract surgery, staged surgery.**

1. INTRODUCTION

Ocular trauma is a major cause of monocular vision loss, especially in young working men. In adherent leucoma from penetrating injury with iris incarceration, the iris typically remains permanently adherent to the posterior corneal scar, a problem worsened by post-traumatic cataract and harder to manage than either condition alone [1].

Coexistent adherent leucoma and traumatic cataract are among the most challenging anterior segment problems, associated with poor visualization, chamber instability, pupil distortion and zonular compromise [2]. Management is usually staged — primary PKP before cataract surgery, or synechiolysis followed by lens extraction — which prolongs rehabilitation and increases risks of graft rejection, steroid dependency and astigmatism. Reports of single-stage, non-keratoplasty management remain limited to isolated cases [3].

The present case is unique in combining four related steps in one surgery — mechanical synechiolysis, pupilloplasty, small incision cataract surgery (SICS) with capsular tension ring implantation, and in-the-bag intraocular lens (IOL) implantation — without primary corneal transplantation. Precise zonular support and iris reconstruction with meticulous synechiolysis achieved anatomical restoration and rapid, stable visual recovery despite a large non-central corneal scar, a step avoided in previously reported cases that used staged intervention or PKP as a preliminary treatment.

This report describes the surgical technique and outcome of single-stage anterior segment reconstruction in a patient with traumatic cataract and adherent leucoma, highlighting it as an alternative to primary keratoplasty in selected patients.

1.1 Principal Complaint and History of Present Illness

- **Time of injury (12 months prior):** 48-year-old male construction worker sustained blunt trauma to the right eye from a flying metallic splinter.
- **Immediate management:** Emergency primary corneal laceration repair at a local hospital**.**
- **Early course (months 1–4):** Vision remained reduced but stable after initial healing.
- **Progressive decline (months 4–12):** Vision deteriorated gradually to hand-movements level.
- **Presentation (month 12):** Patient presented for evaluation of poor vision, denying pain, redness, discharge, photopsia, floaters, or diplopia.

1.2 Pertinent Medical History

Medical history was non-contributory, including no diabetes, hypertension, autoimmune disease, previous eye surgery, refractive error, amblyopia or drug allergies.

Review of systems: No family history of congenital cataract or glaucoma, blindness or hereditary eye disease.

1.3 Patient Timeline

Table 1: Clinical Timeline of Ocular Trauma, Surgical Reconstruction, and Postoperative Visual Recovery

Time Point	Event
Month 0 (day of injury)	Blunt trauma of the right eye from a flying metallic splinter at a construction site; emergency primary corneal laceration repair was performed by a local hospital.
Months 1–4	Initial wound healing; vision reduced but stable.
Months 4–12	Gradual loss of sight in the right eye to hand movements over 8 months.
Month 12 (presentation)	Evaluated at my institute; BCVA hand movements; adherent leucoma with traumatic cataract; B-scan, bloodwork, and ECG were normal.
Day of surgery	Single stage in the anterior segment reconstruction: synechiolysis, pupilloplasty, SICS with capsular tension ring and in-the-bag IOL implantation.
Postoperative day 1–7	Mild corneal edema and anterior chamber flare resolving; BCVA improved to 6/24 by day 7.
Postoperative month 1	Cornea cleared around the leucoma; pupil central and round; BCVA 6/12.
Postoperative month 3	BCVA stable at 6/12; corneal scar stable and localized away from the visual axis.

Interpretation:
The table summarizes progression from ocular trauma and gradual visual loss to surgical intervention and postoperative recovery, with BCVA improving from hand movements to 6/12 at 3 months postoperatively**.**

2. EXAMINATION INCLUDING LABORATORY

General physical and systemic examination was normal.

Right eye: Hand-movements vision, not improving with pinhole. Slit-lamp exam showed a well-healed para-central-inferior adherent leucoma (~3.5 × 2.0 mm) with iris incarcerated into the scar, causing an inferiorly distorted pupil. A dense mature cataract was present peripherally, with a shallow, asymmetrical chamber. IOP 14 mmHg.

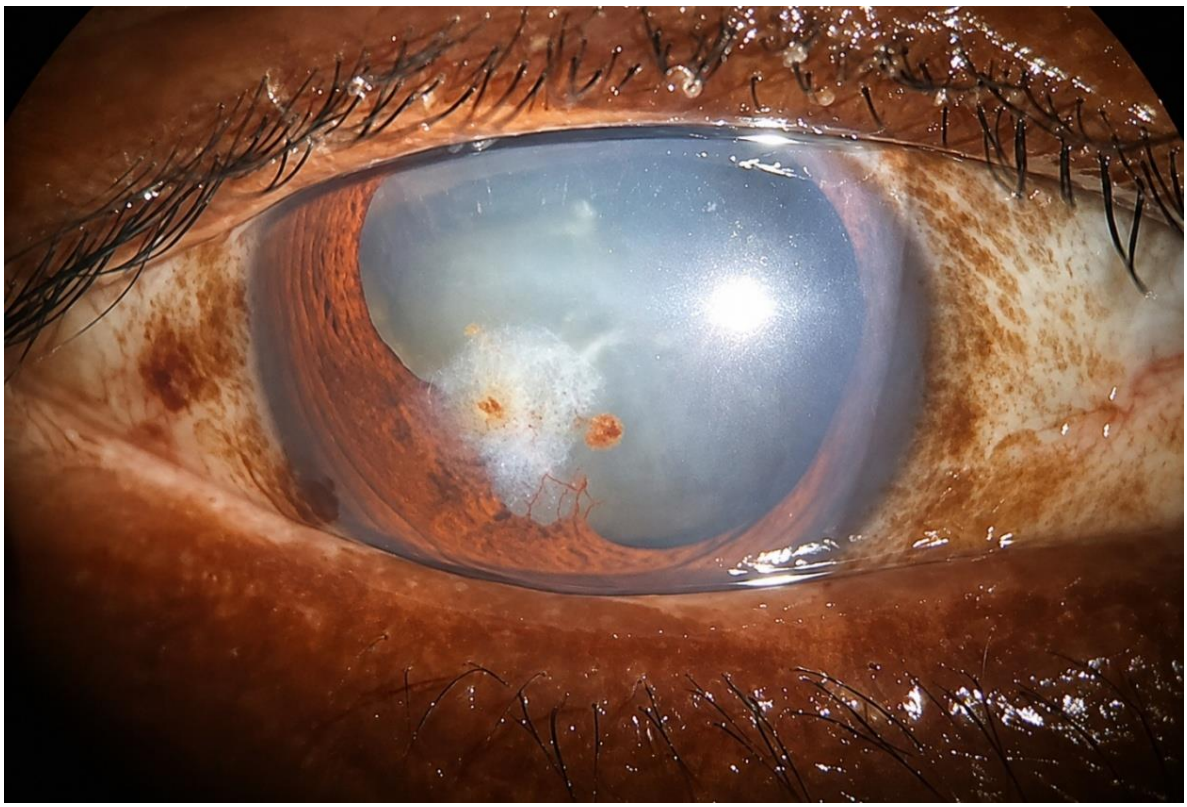


Fig 1. Preoperative slit-lamp exam showing corneal opacity

Left eye: Visual acuity 6/9 uncorrected; slit-lamp and fundus exam entirely normal, IOP 13 mmHg.

B-scan confirmed clear vitreous, attached retina, no foreign body. Blood workup and ECG were normal, clearing the patient for local anesthesia.

3. RELEVANT NEGATIVE FINDINGS

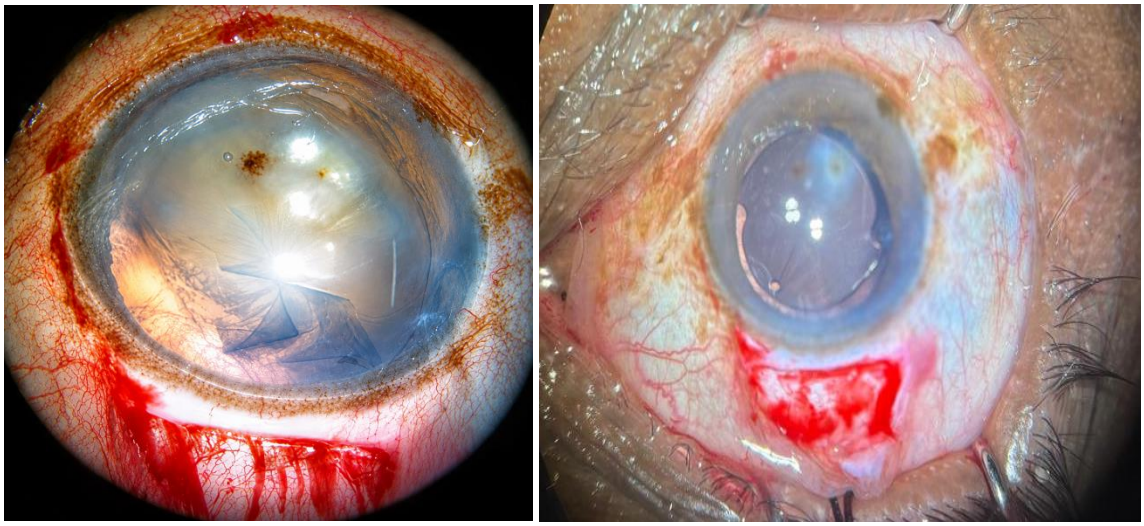
No pain, redness, discharge, photopsias, previous surgery, refractive error, drug allergy, systemic disease or significant family history. Normal left eye; B-scan was normal with no foreign body, hemorrhage or detachment. IOP was normal, Blood Workup was normal, and ECG was normal.

3.1 Differential Diagnosis and Clinical Reasoning

Vitreous hemorrhage (clear vitreous), retinal detachment (attached retina on B-scan), retained foreign body (none seen, no siderosis), phthisis bulbi (normal IOP/contour), and sympathetic ophthalmia (normal fellow eye) were excluded, directing management toward anterior segment surgery rather than vitreoretinal surgery or primary keratoplasty.

3.2 Management and Outcome

Under peribulbar anesthesia, a side-port incision was made away from the scar and OVD injected to stabilize the chamber. The posterior scar was opened and the leucoma separated from the iris; iris hooks retracted the irregular iris to create a stable surgical window. Capsulorhexis was performed, a capsular tension ring inserted for zonular weakness, followed by SICS and cortical aspiration. A PMMA IOL was placed in the bag and the pupil sphincter repaired with a McCannel suture.



A **B**

Fig 2.Intraoperative views: (A) after synechiolysis and capsulorhexis; (B) PCIOL implantation in the bag

3.3 Postoperative Outcome

- **Postoperative Medications and Recovery Timeline**

Topical dexamethasone was tapered as inflammation subsided, homatropine kept the pupil mobile, and hypertonic saline treated corneal edema; oral prednisolone was withdrawn over 7 days. Recovery proceeded as expected, with stability by month 3.

- **Follow-up Findings**

Table 2: Postoperative Follow-up Findings and Visual Outcomes After Anterior Segment Reconstruction

Visit	Wound / Cornea	Anterior Chamber / Pupil	IOL	IOP	BCVA
Day 1	Wound site healthy; mild corneal edema around the scar	Flare ++; pupil sluggishly reactive	Well-centered	Not recorded	Not recorded
Day 7	Wound site healthy; cornea clear apart from pre-existing opacity	Mild (+) reaction; pupil round, regular, reactive	Good centration	18 mmHg	6/24
Month 1	Cornea cleared significantly around the leucoma	Pupil central and round	Centred, stable	Not recorded	6/12
Month 3	Corneal scar stable and localized, away from the visual axis	Quiet; pupil stable	Centred, stable	Not recorded	6/12, stable

Interpretation: The table shows progressive corneal healing, stabilization of the anterior chamber and pupil, good IOL centration, and BCVA improvement from 6/24 on day 7 to 6/12 by month 1, which remained stable at month 3**.**

- **Postoperative Complications**

No significant complications occurred. Day-1 flare and edema were transient, resolving by day 7, with no wound leak, hyphema, raised IOP, or recurrent synechiae over 3 months.

4. DISCUSSION

The present case highlights the possibility of single-stage anterior segment reconstruction for meaningful visual rehabilitation of a select patient with traumatic cataract and adherent leucoma, who is suitable for the procedure, without the need for primary keratoplasty. The combination of synechiolysis, pupilloplasty, cataract surgery with capsular tension ring and in-the-bag IOL restored anterior segment anatomy and helped restore BCVA from hand movements to 6/12 by 1

month with a stable visual outcome by 3 months. The lack of postoperative complications or recurrent synechiae also suggests the feasibility of this eyes-preserving approach in the right candidate. These findings are discussed below relative to previous surgical approaches and reported outcomes.

Yavari et al (2025) highlighted that advanced drug delivery and nanotechnology approaches for the anterior segment remain promising but are largely preclinical. The present case instead demonstrates an immediate surgical approach — synechiolysis, pupilloplasty, SICS and in-the-bag IOL implantation — for traumatic cataract complicated by adherent leucoma. Visual recovery to 6/12 without keratoplasty suggests that, in well-selected patients, surgical reconstruction sparing the cornea may be feasible compared with more invasive procedures. While advanced drug-delivery systems aim at therapeutic delivery, the present study aims at anatomical reconstruction and functional visual restoration [4].

Raj et al. (2016) reported that progressive decrease in central corneal thickness of the graft over the six months following penetrating keratoplasty was the most common indication for this procedure, with adherent leucoma the most common postoperative finding. In the present case, however, adherent leucoma was managed successfully alongside traumatic cataract without keratoplasty, using single-stage synechiolysis, pupilloplasty, SICS with capsular tension support, and in-the-bag IOL implantation. Improvement from hand movements to 6/12 by 3 months in a patient with a stable non-central scar suggests cornea-sparing reconstruction can achieve visual rehabilitation without graft-related procedures [5].

The staged surgical burden is avoided, patients recover faster, and the native cornea is preserved. SICS reduced endothelial trauma and induced astigmatism, while the CTR allowed safe in-the-bag IOL placement. Limitations include dependence on surgeon experience, applicability only to non-central scars, risk of hyphema during synechiolysis, and no formal endothelial assessment.

Avoiding primary PKP is therefore valuable, sparing the patient graft rejection, failure, astigmatism and prolonged immunosuppression — especially important in a post-traumatic eye. This case shows that a stable, non-central scar can be left untouched while still achieving excellent acuity, consistent with a cornea-preserving approach that avoids surgery on a visually insignificant lesion.

The novelty lies in performing four reconstructive steps simultaneously for a pathology conventionally managed with staging or keratoplasty. This approach suits patients with a cataract amenable to small-incision extraction, a limited, stable, non-central scar, and no access to donor tissue or graft surveillance — particularly relevant in resource-limited regions.

Generalizability is limited; prospective studies with longer follow-up comparing this approach with staged or PKP-based surgery are needed before wider adoption.

5. CONCLUSION

Single-stage synechiolysis, zonular-associated cataract surgery (ZACS) with in-the-bag IOL yielded 6/12 visual acuity and a stable anterior segment at 3 months, without keratoplasty. Performing four reconstructive steps conventionally staged as a single procedure supports meaningful recovery without graft-related risks. This cornea-conserving approach may serve as a useful first-line therapy in resource-limited settings for selected patients with limited scars, and merits consideration for wider use pending comparison with keratoplasty in larger series.

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