

Surgical Outcomes of Retinal Detachment in Sickle Cell Retinopathy: A Systematic Review

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ABSTRACT

This systematic review aims to perform an overview of the surgical outcomes of retinal detachment in sickle cell retinopathy according to the previously published studies. Using PRISMA chart guidelines to collect, extract, and clean all reports related to this systematic review (Fig. 2). From total 1051 studies were collected from different search engines, only 5 met this review's inclusion criteria and included in the final assessment. Regarding the risk of bias, the Newcastle-Ottawa Quality Assessment Form for RCTs Studies. Also, QUIN quality assessment tool was used to assess the quality among the included studies. To conclude from the eligible studies, vision can be restored, anatomy can improve, and ischemic complications can be minimized with sickle-aware peri-operative care. The earlier we intervene—and the more deliberately we tailor the approach to tractional complexity—the lower likelihood of proliferative vitreoretinopathy (PVR) and the more likely patients are to trade the opacity of vitreous hemorrhage or the distortion of detachment for a durable, functional visual recovery.

KEYWORDS: Sickle cell – retinopathy – retinal detachment – Oculopathy – systematic review.

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INTRODUCTION

Sickle cell disease (SCD) represents one of the most prevalent hereditary hemoglobinopathies worldwide, characterized by a single point mutation in the β -globin gene that leads to the substitution of valine for glutamic acid at the sixth position of the β -chain. This molecular defect results in the formation of abnormal hemoglobin S, which polymerizes under hypoxic conditions, distorting red blood cells into a sickled shape (Chen et al., 2014). These deformed erythrocytes demonstrate increased rigidity and reduced deformability, predisposing to microvascular occlusion, tissue ischemia, and chronic end-organ damage. While SCD is primarily recognized for its systemic complications—such as vaso-occlusive crises, anemia, and multi-organ failure—its ocular manifestations have gained growing clinical attention due to their potential to cause irreversible visual loss, particularly through sickle cell retinopathy (SCR) (Williamson, Rajput, Laidlaw, & Mokete, 2009).

Sickle cell retinopathy is a vaso-occlusive retinopathy resulting from recurrent ischemic insults to the retinal microcirculation (Rohowetz et al., 2024). The disease can be broadly categorized into non-proliferative and proliferative forms, with the latter posing the greatest threat to vision. In proliferative sickle cell retinopathy (PSCR), chronic retinal ischemia stimulates the upregulation of vascular endothelial growth factor (VEGF), promoting the formation of fragile, abnormal neovascular fronds often described as “sea-fan” neovascularization (Okonkwo, Hassan, Oyekunle, Akanbi, & Agweye, 2024). These fragile vessels are prone to rupture, leading to vitreous hemorrhage, fibrovascular proliferation, and subsequent tractional or rhegmatogenous retinal detachment (RD). Such detachments, if untreated or inadequately managed, often culminate in profound and irreversible vision loss, particularly in young individuals during their most productive years (Fig. 1).

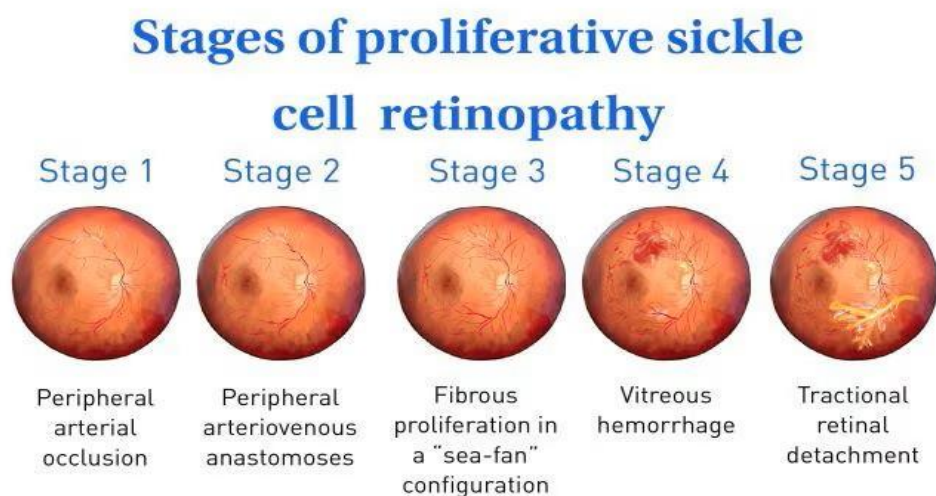


Figure 1 The stages of sickle cell retinopathy

The pathophysiology of retinal detachment in sickle cell retinopathy is multifactorial. Tractional forces generated by fibrovascular membranes, combined with degenerative retinal changes and peripheral ischemic atrophy, contribute to retinal breaks and detachments (Nangia, Wai, Scott, Rahimy, & Mruthyunjaya, 2025). Moreover, the ischemic and hypoxic milieu of sickle cell eyes imposes unique surgical challenges. The retinal tissue is fragile, the vasculature is compromised, and the risk of postoperative complications—such as recurrent hemorrhage, anterior segment ischemia, and neovascular glaucoma—is markedly elevated compared with non-sickle cell eyes. Consequently, surgical management of RD in the context of SCR demands a highly tailored approach, balancing the need for anatomical reattachment with the preservation of already compromised ocular perfusion (Ahmed et al., 2024).

Advancements in vitreoretinal surgery, particularly the advent of small-gauge pars plana vitrectomy (PPV), improved intraoperative visualization, and refined fluid–gas exchange techniques, have significantly enhanced the prognosis of retinal detachment in sickle cell eyes. Historically, conventional scleral buckling procedures were frequently associated with disastrous outcomes, including anterior segment necrosis and severe ischemia, primarily due to the disturbance of the already precarious ocular blood flow (Okonkwo et al., 2024). Modern PPV techniques, however, have allowed surgeons to more precisely relieve traction, remove vitreous hemorrhage, and manage fibrovascular proliferation with minimal iatrogenic trauma. In addition, preoperative optimization through systemic hydration, oxygenation, and avoidance of acidosis—along with careful intraoperative control of intraocular pressure—has further improved the safety profile of these procedures (Abdalla Elsayed et al., 2019).

Despite these advancements, the surgical management of retinal detachment in sickle cell retinopathy remains complex and unpredictable (Hassan et al., 2021). Postoperative visual outcomes vary widely, with several studies reporting that anatomical success does not always translate into functional visual recovery (Ho, Grabowska, Ugarte, & Muqit, 2018). The persistence of macular ischemia, recurrent hemorrhage, or postoperative proliferative vitreoretinopathy may limit visual rehabilitation even after successful reattachment. Furthermore, the lack of standardized treatment protocols and limited longitudinal data specific to this subgroup hinder the ability to formulate evidence-based guidelines (Dinah et al., 2024).

Understanding the determinants of surgical outcomes in this population is thus crucial. Factors such as the type and extent of detachment (tractional, rhegmatogenous, or combined), duration of detachment before intervention, preoperative visual acuity, and intraoperative complications can all significantly influence prognosis (Rohowetz et al., 2024). Similarly, the type of surgical approach—whether PPV alone, PPV combined with endolaser photocoagulation, or adjunctive use of tamponade agents such as silicone oil or gas—must be carefully evaluated to establish optimal management strategies. In addition, systemic control of sickle cell disease and coordination with hematology teams play a vital role in minimizing intra- and postoperative risks (Fuseini et al., 2025).

Given the burden of SCD in populations of African, Middle Eastern, and Mediterranean descent, and its rising global prevalence due to migration and improved survival rates, the ophthalmic implications of this disease are becoming increasingly significant (Nangia et al., 2025). Retinal detachment in sickle cell retinopathy not only represents a severe ophthalmic emergency but also a major cause of preventable blindness in this demographic. Therefore, comprehensive assessment of surgical outcomes in these patients is essential to refine clinical decision-making, optimize patient counseling, and ultimately improve both anatomical and functional visual results (Brandsen et al., 2025).

By analyzing surgical techniques, intraoperative challenges, and postoperative complications, this research seeks to contribute to the limited body of evidence guiding vitreoretinal management in this unique and high-risk population (Pulido, Flynn, Clarkson, & Blankenship, 1988). A clearer understanding of these outcomes may lead to more effective, evidence-based surgical protocols and better visual prognoses for patients suffering from this vision-threatening complication of sickle cell disease. Therefore, this systematic review aims to make an overview to the surgical outcomes of retinal detachment in sickle cell retinopathy according to the previously published studies.

RESEARCH METHODS

The Prospective Observational Study to Evaluate Predictors of Clinical Effectiveness in Response (PROSPERO) was designed to make an overview to the surgical outcomes of retinal detachment in sickle cell retinopathy according to the previously published studies.

Protocol

All the screened studies were selected according to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines.

For the literature as systematic review in this project, the PICOT question will be as follow:

(P) Participants: Subjects who underwent retinal detachment repair secondary to sickle cell retinopathy.

(I) Intervention: Parsplana vitrectomy , scleral buckle or both

(C) Control: Nonsurgical interventions (if found).

(O) Outcome: anatomic reattachment of the retina

(T) Time: Studies published from 1980 till 2025.

The research question was: "What are the surgical outcomes of retinal detachment repair in sickle cell retinopathy?"

Using PRISMA chart guidelines to collect, extract, and clean all reports related to this systematic review (Fig. 2). From total 1051 studies were collected from different search engines, and by using Rayan software to remove duplicates (n=71) and any studies

were ineligible (n=112), about 614 studies were then further screened and 403 studies were retrieved to only 5 obeyed to the screening after removing any reported in the scope. Studies took the observational findings in the review (n=254).

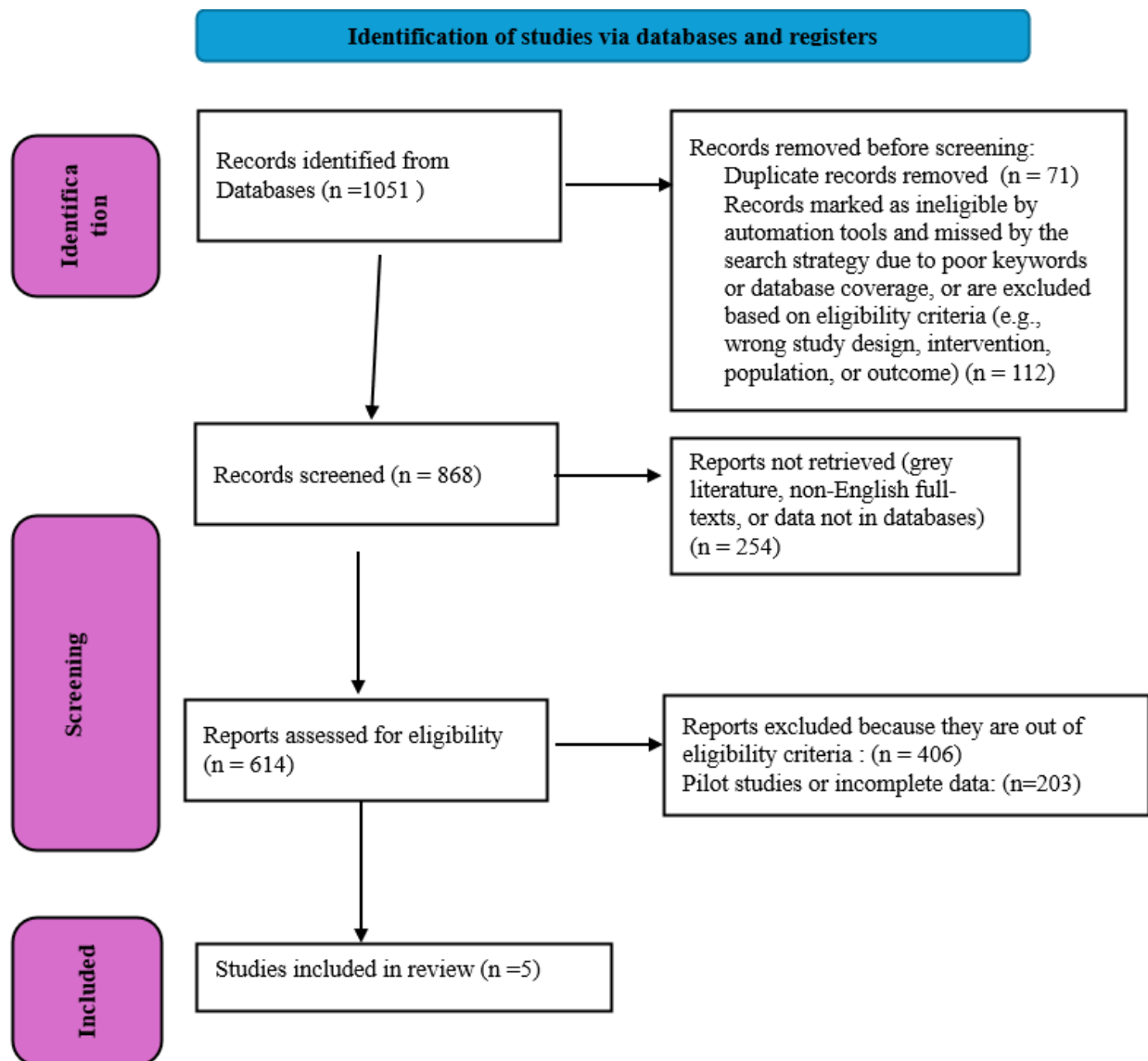


Figure 2 PRISMA flowchart of this study

Data Sources and Search Strategy

The databases' sources used for this systematic review were PubMed Central (PMC), Web of Science (WOS), Scopus, and Google Scholar. These databases were searched for reports published in the last 45 years until August 2025. The MeSH terms (Medical Subject Headings) used were: "surgical OR surgery AND Sickle cell diseases OR sickle cell retinopathy OR sickle retinopathy AND retinal detachment OR retinopathy detachment".

Inclusion and exclusion criteria

The literature search was conducted through the electronic databases, and the eligibility criteria was set as following:

The inclusion criteria are:

- Studies published between 1980-2025
- Studies were carried out in specialized hospitals and under the supervision of specialists and with consultation in some healthcare settings and with appropriate ethical considerations.
- Reports either interventional, randomized controlled trials, case-studies, case-controls, or observation relating to the assessment.
- Studies only performed on human subjects.

The exclusion criteria are:

- Narrative, literature, and systematic reviews.
- Pilot studies.
- Non-English language studies.

Data Extraction and Analysis

The data were extracted and analyzed by efficient reviewers who extracted data from the included articles' texts, including abstract, location, and settings, interventions, main outcomes, discussion, conclusions, and limitations (if found).

Risk of Bias (RoB) / Quality of the Reports

Regarding the risk of bias, the Newcastle-Ottawa Quality Assessment Form for RCTs Studies. Also, QUIN quality assessment tool was used to assess the quality among the included studies (Fig. 3). A total of five items were included in the quality criticism for these studies. Each item was rated by the reviewer with scores of 1 (reported) and 0 (not reported) as shown in the following table (Table 1).

Quality Assessment

The quality assessment was performed to find that Ahmed et al. (2024) and Rohowetz et al. (2024) achieved the highest quality scores (6/7), indicating clearly stated aims, ethical oversight, appropriate analyses, well-presented results, suitable interventions, and clearly defined outcomes. Pulido et al. (1988) scored lowest (4/7), mainly due to lacking a clear aim statement and ethical documentation, though its results, discussion, and outcome reporting were satisfactory. Chen et al. (2014) and Ho et al. (2018) both received intermediate scores (5/7). Each study demonstrated suitable methodology and intervention but had limited presentation of results or missing ethical clarity. Overall, most studies met the majority of quality criteria, though older studies tended to lack ethical reporting, while more recent ones demonstrated stronger methodological rigor and clearer reporting standards (Table 1).

Table 1 Quality assessment of the included studies (n=5)

Study	Clear aim	Appropriate statistical analysis	Ethical considerations	The results 'presentation	Suitable discussion	Appropriate intervention	Clear outcomes	Total score
(Ahmed et al., 2024)	1	1	1	1	1	1	1	6
(Pulido et al., 1988)	0	1	0	1	1	1	1	4
(Chen et al., 2014)	1	1	1	0	1	1	1	5
(Rohowetz et al., 2024)	1	1	1	1	1	1	1	6
(Ho et al., 2018)	1	1	1	0	1	1	1	5

RESULTS

The RoB assessment

The risk-of-bias assessment, as illustrated in the summary and corresponding graph, shows that the overall methodological quality of the included studies ranged from moderate to high. Most investigations demonstrated clearly defined outcomes, appropriate surgical interventions, and adequate interpretation of results, reflecting a generally reliable evidence base. More recent studies tended to perform better, consistently meeting criteria for ethical approval, sound statistical analysis, and transparent reporting of objectives and findings.

In contrast, earlier work showed shortcomings, particularly in articulating study aims and documenting ethical oversight. While the presentation of results was generally satisfactory across studies, variations were noted in the completeness of data reporting and the depth of analysis. Despite these limitations, the discussions provided were largely appropriate and aligned with reported outcomes, supporting reasonable interpretation of findings.

Overall, the risk-of-bias profile suggests that most available evidence is methodologically sound, though caution is warranted when interpreting older studies, which lacked several key indicators of quality that were more consistently addressed in contemporary research.

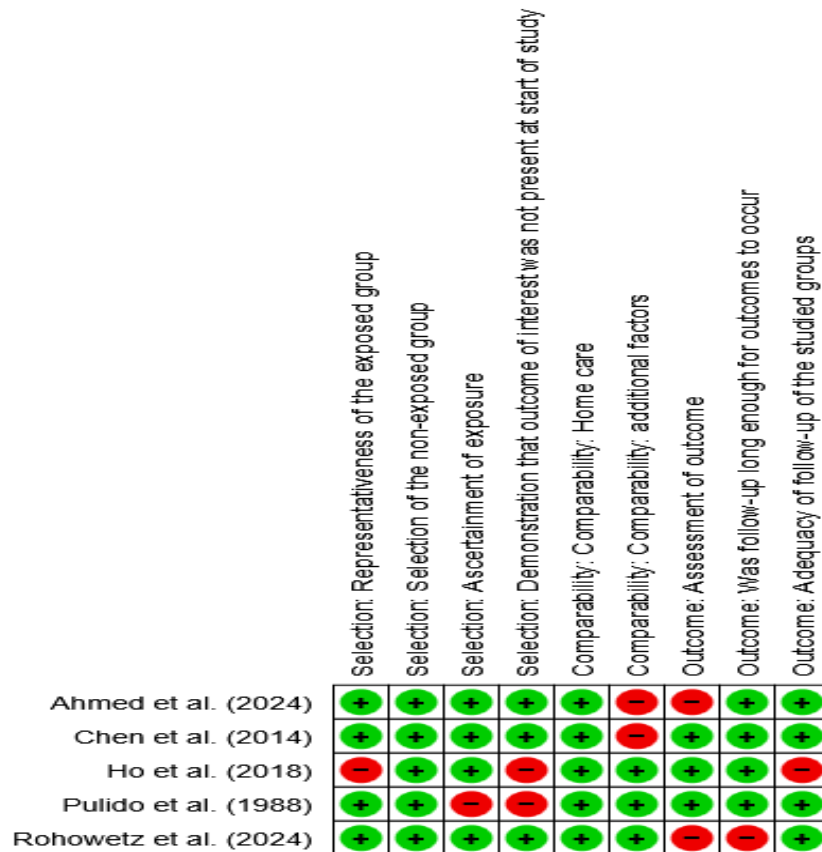


Figure 3 The RoB summary

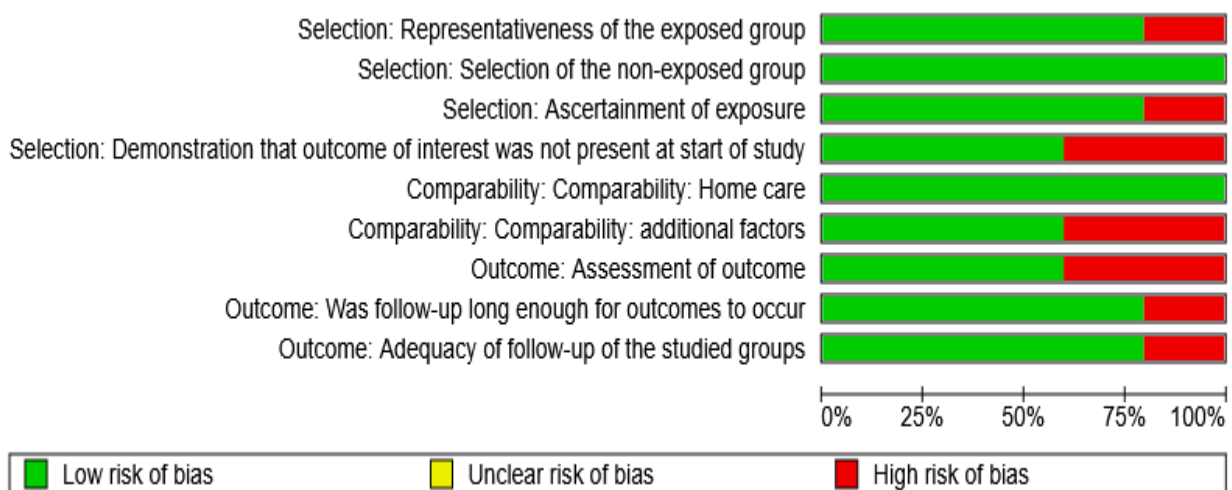


Figure 4 The RoB assessment graph

Study characteristics

The main studies' characters for the five reports are depicted in the Table 2.

Table 2 The general characteristics for the included studies (n=5)

Study	Aim	Subjects	Intervention	Design
(Ahmed et al., 2024)	To assess long-term structural and visual results in eyes with retaining detachment secondary to sickle cell retinopathy.	28 patients, 30 eyes; mean age 41.1 years; mostly HbSC (72%), then HbSS and trait. Macula involved in 76.7%; majority phakic and without pre-existing PVD. Follow-up ~48 months.	PPV in 25 eyes; PPV+SB in 5; gauges 20/23/25 (mostly 23). Near-universal membrane work and endolaser; PFO (39%), retinotomy (17%), retinectomy (28%); tamponade in all but one: SO 55%, SF6/C3F8/air in others.	Retrospective consecutive series; statistical modeling for predictors.
(Pulido et al., 1988)	This study is a retrospective analysis of ten patients with PSR-related complications who underwent standard pars plana vitrectomy, with or without preoperative exchange transfusion. It also explores the role of exchange transfusion in this setting, particularly regarding the potential for anterior segment ischemia and the risks associated with transfusion.	10 patients, 11 eyes; all HbSC with proliferative sickle retinopathy (PSR). Mean age 40.8 years; mean follow-up 15 months.	20-gauge vitrectomy systems; endo-illumination; endolaser/cryo/diathermy as needed; scleral buckle (SB) in selected eyes; one silicone oil (SO) for PVR; prophylactic encircling band in bilaterally operated patient without obvious breaks; peri-operative hydration/oxygen; several early-series exchange transfusions	Retrospective interventional case series
(Chen et al., 2014)	To present the results of contemporary vitreoretinal surgical treatment for proliferative sickle retinopathy and to evaluate how these outcomes compare with earlier reports.	14 patients, 15 eyes; mean age 48; genotypes: SC (9), AS (4), Sβ ⁺ -thal (1). Follow-up ~27 months.	PPV (20/23/25G); encircling SB in 2 RD cases; valved cannulas common; tamponade gas or SO (3 cases). No exchange transfusions.	Retrospective interventional series.
(Rohowetz et al., 2024)	To describe the clinical features and postoperative results of patients who underwent surgery for proliferative sickle cell	61 patients, 65 eyes; mean age 41; predominantly Black; genotypes SC (44%), SS (26%), trait (24%), Sβ ⁺ -thal (6%). Follow-up ~42 months.	PPV alone (55%) or combined SB/PPV (45%); gauges 20/23/25; universal endolaser; no rectus muscle manipulation; no pre-op transfusions; anesthesia largely regional. Tamponade in most RDs: SO 58%, C3F8 31%, SF6 8%, air	Retrospective; pre-specified pre-stats including ANCOVA.

	retinopathy (PSCR).		2%; PFO used more often with SB/PPV.	
(Ho et al., 2018)	To describe structural and visual results in individuals with proliferative sickle retinopathy (PSR) treated using either 23-gauge or 20-gauge vitrectomy.	63 patients, 71 eyes with PSR; mean age 41.7; majority phakic; 20G and 23G PPV used. Follow-up ~26 months.	PPV only; ILM peel and gas as indicated; SO used in 20 RD eyes (7 with primary retinectomy). PRP applied peri-operatively in many cases.	Retrospective audit; surgeon-dependent techniques; no SB use and no exchange transfusions.

Common Findings

Pars plana vitrectomy represents the primary surgical approach for managing proliferative sickle retinopathy-related complications, including vitreous hemorrhage and tractional or combined rhegmatogenous retinal detachment. Endolaser and meticulous membrane dissection are routinely incorporated, while perfluorocarbon liquid, drainage retinotomy, or retinectomy are reserved for eyes with severe traction.

Eyes presenting with non-clearing vitreous hemorrhage and no detachment generally achieve excellent outcomes, with high anatomic success and final visual acuity frequently reaching 20/60 or better.

In eyes with retinal detachment, particularly those with tractional or combined mechanisms, single-operation success is modest at approximately sixty to seventy percent; however, final anatomic success is high after additional procedures. Visual improvement is expected but may be limited.

Macular involvement at presentation is the most important factor influencing final vision. Eyes with longstanding or macula-off detachment consistently demonstrate poorer postoperative visual results, even when anatomic success is achieved.

Proliferative vitreoretinopathy is the principal cause of surgical failure and redetachment. Most recurrences occur within the first postoperative year and typically require further vitrectomy, often with retinectomy and silicone oil tamponade.

Silicone oil use is repeatedly associated with worse final visual acuity and lower single-operation success across modern series. This relationship likely reflects the severity of disease rather than a direct adverse effect, but its use should remain selective, with planned removal when feasible.

Adjunctive scleral buckle may improve single-operation anatomic success in eyes with complex combined tractional and rhegmatogenous detachment, although successful outcomes can still be achieved without it in experienced centers, leading to variation in clinical practice.

Preventing iatrogenic retinal breaks and minimizing the need for retinectomy are important surgical goals, as both factors correlate with higher rates of anatomic failure and poorer visual outcomes when they occur.

Prior panretinal photocoagulation appears protective, with absence of prior laser associated with worse outcomes. Assessment and completion of scatter treatment should be considered when appropriate.

Modern series demonstrate a favorable perioperative safety profile, with no reported cases of anterior segment ischemia when standard precautions are followed, even without routine exchange transfusion. Most complications, including cataract progression and postoperative intraocular pressure rise, are generally manageable.

Practical Takeaways

Preoperative care emphasizes adequate oxygenation and hydration, assessment of hemoglobin genotype, documentation of macular status, and evaluation of prior panretinal photocoagulation. Routine exchange transfusion is not required.

Intraoperatively, pars plana vitrectomy with wide endolaser and careful membrane delamination forms the procedural foundation. Surgeons should minimize iatrogenic breaks, reserve retinectomy for unavoidable cases, consider scleral buckle when peripheral traction or combined pathology is present, and preferentially employ gas tamponade when suitable rather than silicone oil.

Postoperatively, patients require close monitoring for proliferative vitreoretinopathy-related recurrence during the first six to twelve months. Cataract development should be anticipated, silicone oil removed when possible, and intraocular pressure and neovascular glaucoma actively managed.

Patients should be counseled that non-clearing vitreous hemorrhage generally responds well to surgery with strong visual

recovery, while retinal detachment frequently requires more than one procedure and visual outcomes are largely determined by preoperative macular status and the development of proliferative vitreoretinopathy.

DISCUSSION

Across five series spanning four decades, a consistent picture emerges: vitreoretinal surgery for sickle cell retinopathy (SCR) can restore anatomy and meaningfully improve vision, especially when the macula is spared and when the indication is non-clearing vitreous hemorrhage (VH) (Dinah et al., 2024). The drivers of failure are equally consistent—proliferative vitreoretinopathy (PVR), complex combined tractional/rhegmatogenous detachments, macula-off status at presentation, and the frequent need for silicone oil (SO), which often flags more severe disease and is associated with poorer final visual acuity (Abdalla Elsayed et al., 2019).

The earliest experience (Pulido) is notable for meticulous peri-operative sickle-specific precautions—local anesthesia without epinephrine, supplemental oxygen, aggressive hydration, and selective exchange transfusions earlier in the series. That protocol coincided with an absence of recognized anterior segment ischemia, an historical concern in SCR. Even with 20-gauge systems and limited instrumentation by today's standards, visual gains were achievable: VH cases improved from hand motions to functional levels, and several retinal detachment (RD) cases reached 20/50–20/40 when reattachment was durable. Failures clustered where operative complexity escalated—unplanned breaks, macula involvement, and PVR requiring silicone oil (Fuseini et al., 2025).

Modern cohorts (Ahmed, Rohowetz, Chen, Ho) reinforce and refine those themes. First, single-surgery anatomic success (SSAS) rates for RD hover around 60–72% at six months, with ultimate reattachment higher after reoperations. Second, eyes repaired without SO tend to do better visually and anatomically; in multiple series, eyes requiring SO had lower SSAS and worse final acuity, even after adjusting for baseline vision. This is less an indictment of SO than a biomarker of case severity: surgeons reserve oil for the most fibrotic, tractional, or recurrent detachments, where PVR is common and relaxing retinectomy is sometimes unavoidable.

Macula-off RDs start behind and rarely catch up. Where macula-sparing status is maintained, final acuity is frequently 20/40 or better, while macula-off eyes cluster in the 20/200 or worse range despite anatomical success. That gradient underscores the importance of timely referral and expeditious primary repair; in some series the mean time to surgery stretched into weeks, likely reflecting real-world access and triage constraints.

The VH alone remains the “low-hanging fruit”: clearing the hemorrhage with pars plana vitrectomy (PPV) reliably improves vision, often to driving-level acuity, with low ischemic complication rates. By contrast, combined TRD/RRD is the most treacherous phenotype. These eyes commonly require segmentation/delamination, perfluorocarbon liquids, drainage retinotomies or retinectomies, and tamponade; they also redetect more often and account for most PVR-driven reoperations. Several cohorts documented redetachment rates approaching 40% overall, with PVR responsible in the large majority of cases and reoperation frequently performed under SO (Brandsen et al., 2025).

Gauge size and anesthesia technique appear secondary to disease biology. Whether 20-, 23-, or 25-gauge, and whether local monitored anesthesia or general anesthesia, outcomes were broadly similar after accounting for case mix. Some series hinted at modestly better visual gains with small-gauge systems, but differences were not statistically robust. Scleral buckle (SB) remains a selective adjunct. In recent series, combined SB/PPV trended toward higher Single-surgery anatomic success (SSAS) (when there is an achievement of a successfully reattached retina after a single surgical intervention) than PPV alone for complex RDs, but again, selection bias complicates inference; surgeons often add a buckle when peripheral traction is prominent. Notably, modern series reported no anterior segment ischemia despite avoiding exchange transfusions, suggesting that careful intra- and postoperative oxygenation, hydration, and avoidance of vasoconstrictors may be sufficient in most cases.

Lens status evolves predictably. Many eyes are phakic preoperatively and develop cataract afterward, particularly with gas/SO tamponade and prolonged inflammation. Cataract surgery is therefore part of the longitudinal care pathway and often improves final visual function once the retina is stable.

Two practical implications were followed; first, pre-treating and monitoring the fellow eye is critical. High rates of advanced PSR in fellow eyes in contemporary series argue for proactive laser when indicated, which may reduce future detachment risk and as suggested by some analyses, lower redetachment odds in operated eyes with prior scatter laser. Second, surgical planning should be phenotype-specific: VH → PPV with careful hemostasis and endolaser; localized RRD with minimal traction → PPV ± buckle and gas; diffuse TRD/combined RD → plan for membrane work, possible retinectomy, the likelihood of SO and staged procedures.

Limitations and Future perspectives

Despite the valuable insights provided by these surgical series, several important limitations must be acknowledged. First, all studies were retrospective, creating inherent selection bias and limiting the ability to establish causality. Surgical decisions—such as whether to add a scleral buckle, choose silicone oil instead of gas, perform retinectomy, or use perfluorocarbon liquids—were surgeon-dependent rather than protocol-driven. As a result, it is difficult to determine whether differences in outcomes reflect disease severity or variations in technique. This is particularly relevant when interpreting the poorer outcomes typically associated with silicone oil, because eyes receiving oil were usually the most complex cases, rather than silicone oil itself causing the poorer

results.

Sample sizes were modest, and patient cohorts were heterogeneous. Eyes with vitreous hemorrhage, tractional detachment, rhegmatogenous detachment, and combined pathology were often grouped together, even though these entities carry fundamentally different prognoses. Hemoglobinopathies also varied, including HbSC, HbSS, and sickle trait, yet the small number of patients prevented meaningful comparison between genotypes. Timing of surgery was likewise inconsistent; eyes presented at variable intervals after onset of detachment, and macular status—one of the most important predictors of final visual function—was not uniformly documented or statistically controlled.

Beyond this, procedural variability introduces further uncertainty. Studies used a mix of 20-, 23-, and 25-gauge approaches, with or without scleral buckle, and with differing tamponade preferences. PVR grading was inconsistently documented, though PVR was repeatedly the major cause of recurrent detachment. Because documentation of preoperative OCT and macular epiretinal membranes was limited—often due to media opacity—pre-existing macular pathology may have been under-recognized. Follow-up durations differed substantially between studies, potentially influencing reported reattachment rates, cataract progression, or late complications.

Systemic management of sickle cell disease was not standardized. Earlier series utilized exchange transfusions, while more recent cohorts did not, relying instead on hydration and oxygen supplementation. Without consistent protocols, determining which perioperative strategies are necessary—or sufficient—to minimize vaso-occlusive complications remains challenging. While anterior segment ischemia was not observed in recent reports, low event frequency makes this difficult to interpret with confidence. Finally, patient-centered outcomes, such as quality-of-life measures, visual functioning, and long-term visual disability, were largely absent.

Taken together, these limitations highlight the need for more structured inquiry. Future work should ideally adopt prospective, multicenter designs to overcome small sample sizes and capture the full spectrum of disease. A unified reporting framework would be beneficial, including standardized definitions of anatomic success at fixed postoperative intervals, visual acuity reported in LogMAR, and consistent documentation of macular status, PVR grade, and fellow-eye disease. Surgical pathways might be strengthened by tailoring management strategies to the underlying pathology: non-clearing vitreous hemorrhage tends to respond well to uncomplicated vitrectomy, whereas diffuse traction or combined detachments require early planning for complex maneuvers, membrane dissection, and possible retinectomy, with recognition that silicone oil and multiple operations may be necessary.

Early referral and expedited surgery deserve emphasis, particularly given the strong association between macular detachment and poor long-term vision. Expanding community and hematology-based screening could help identify high-risk PSR before detachment occurs. Similarly, consistent use of wide-field imaging and OCT would improve documentation of macular and peripheral pathology and support better prognostic counseling.

Greater consistency in perioperative sickle-cell management is another priority. While most recent series achieved safe outcomes without transfusion, a formalized protocol for oxygenation, hydration, and avoidance of vasoconstrictive agents would help define best practice and reduce clinician variability. Cataract progression and postoperative IOP elevation were frequently encountered; therefore, integrated long-term follow-up pathways with timely cataract extraction and glaucoma surveillance are recommended. Finally, incorporating patient-reported outcomes would offer a richer understanding of how anatomical success translates into real-world visual function.

CONCLUSION

In conclusion, the arc from Pulido's era to present shows steady gains in safety and technique without erasing the fundamental challenge of fibrovascular traction in SCR. Vision can be restored, anatomy can be stabilized, and ischemic complications can be minimized with sickle-aware peri-operative care. The earlier we intervene—and the more deliberately we tailor the approach to tractional complexity—the lower likelihood of proliferative vitreoretinopathy (PVR) and the more likely patients are to trade the opacity of VH or the distortion of detachment for a durable, functional visual recovery.

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