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Is Routine Follow-up Necessary after Commotio Retinae? A Retrospective Case Series

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Abstract

Background/Objectives:

Commotio retinae is typically a self-limiting traumatic retinopathy, and most patients demonstrate favourable visual recovery following injury. The main objective of this study was to evaluate the clinical utility of routine follow-up in patients presenting with commotio retinae including the frequency of management-changing findings. Secondary objectives were to determine visual and anatomical outcomes, complication rates and outpatient burden.

Subjects/Methods:

This retrospective non-interventional case series included consecutive patients presenting to a UK tertiary ophthalmic emergency centre between 3rd June 2022 and 4th April 2025. Of 58 patients identified, five with significant pathology that independently determined management were excluded, leaving 53 patients for analysis.

Results:

Fifty-three patients were included (mean age 28.7 years; 43/53 [81.1%] male). Peripheral commotio retinae occurred in 39/53 (73.6%) and macular involvement in 7/53 (13.2%). The cohort generated 121 outpatient appointments. One patient (1.9%, 95% CI 0.3%–9.9%) required a management change. At first follow-up, 31/33 patients (93.9%) with documented retinal findings showed anatomical resolution or improvement. Eighteen (34.0%) were discharged after first review and 17 (32.1%) did not attend at least one scheduled appointment. Among 13 patients with paired measurements, median BCVA was 0.00 logMAR (IQR 0.00–0.18) at presentation and − 0.08 logMAR (IQR − 0.08–0.00) at final follow-up ($p = 0.012$).

Conclusions:

Routine follow-up after uncomplicated commotio retinae rarely changed management despite substantial outpatient activity. These findings support evaluating risk-stratified follow-up, prioritising review for patients with high-risk features or significant associated ocular pathology and considering patient-initiated follow-up with safety-netting for selected low-risk patients.

Summary Box

What was known before:

Commotio retinae usually resolves spontaneously with favourable visual outcomes, although delayed sight-threatening retinal complications can occur.

- To our knowledge, there are no specific recommendations from NICE or the Royal College of Ophthalmologists regarding scheduled follow-up after a diagnosis of commotio retinae, and no established evidence-based follow-up pathway.
- Regular ophthalmic follow-up contributes to outpatient demand, making it important to identify patients who are likely to benefit from scheduled review.

What this study adds:

- In this cohort, only 1/53 patients required a management-changing intervention despite the cohort generating 121 outpatient appointments, whilst 31/33 (93.9%) with documented retinal findings demonstrated anatomical resolution or improvement at first follow-up.
- These findings suggest that routine scheduled follow-up may have limited clinical utility in uncomplicated commotio retinae and support further evaluation of a risk-stratified approach to follow-up.

Introduction

Commotio retinae is an acute, self-limiting retinopathy that can occur following blunt ocular trauma and was first described by Berlin in 1873[1]. Histologically, the primary abnormality is disruption of the photoreceptor outer segments, with secondary changes in the retinal pigment epithelium (RPE)[2, 3].

Mechanical deformation of the globe following impact generates shock waves that are transmitted through the ocular tissues to the retina, resulting in damage to the photoreceptors and producing the characteristic transient retinal whitening observed on fundus examination [4].

Commotio retinae is observed in approximately 30% of eye traumas that present for hospital treatment [5]. This condition most commonly affects young individuals following sports-related injuries, interpersonal assault, motor vehicle collisions and other mechanisms of blunt trauma to the eye and orbit.

Commotio retinae generally resolves spontaneously, with most patients demonstrating favourable visual recovery following injury [6]. However, a small proportion of patients develop permanent visual impairment, particularly when the macula is involved [7].

Despite this favourable prognosis, ophthalmologists routinely monitor affected patients because of the potential for associated ocular complications, including retinal tears, retinal detachment, traumatic macular holes, traumatic iritis and secondary glaucoma [8, 9]. However, there is limited evidence regarding the clinical utility of scheduled follow-up in uncomplicated cases. Most patients recover without intervention, and the incidence of delayed sight-threatening complications requiring

management remains uncertain [7]. Consequently, where routine review infrequently alters management, it may contribute to unnecessary hospital attendances and healthcare resource utilisation [10]. Further evidence is therefore needed to determine whether routine follow-up provides meaningful clinical benefit or whether a more selective, risk-stratified approach may be beneficial.

The aim of this study was to evaluate the clinical utility of routine follow-up in patients presenting with commotio retinae. Specifically, we aimed to assess the frequency of findings that changed management, complication rates, follow-up attendance and non-attendance, and to determine whether clinically significant complications were identified during scheduled review or following earlier patient re-presentation.

Methods

This retrospective non-interventional case series was conducted at the Birmingham and Midland Eye Centre (BMEC). Data were obtained from the BMEC mediSIGHT (mediSIGHT, Medisoft Ltd., Leeds, UK) clinical records from 3rd June 2022 to 4th April 2025. A total of 58 patients were initially identified. Patients with significant ocular pathology identified at initial presentation that independently determined subsequent management were excluded. Five patients met the exclusion criteria: two with traumatic macular holes, two with retinal tears and one with significant hyphaema who was later found to have angle recession. No formal sample size calculation was performed; all eligible consecutive patients presenting during the predefined study period were included. The final study cohort consisted of 53 patients.

All data was gathered as a part of routine clinical care, and analysed retrospectively without altering patient care in an anonymised format; therefore, individual patient consent was not required. The study was conducted in accordance with the principles of the Declaration of Helsinki [11] and local institutional policies governing the use of routinely collected clinical data for service evaluation and research were follow; the study was given local clinical audit approval.

Demographic and clinical data were collected, including age, sex, mechanism of injury, time from injury to presentation, presenting best-corrected visual acuity (BCVA), intraocular pressure (IOP), location of commotio retinae, macular involvement, associated ocular injuries, management at presentation, follow-up attendance, complications, interventions performed and final clinical outcomes.

The primary outcome was the clinical utility of routine follow-up, defined as the identification of management-changing findings requiring intervention during scheduled review. Secondary outcomes included visual outcomes, follow-up attendance and non-attendance, number of follow-up appointments, anatomical resolution or improvement of commotio retinae at first follow-up, and whether complications were identified during scheduled review or following earlier patient re-presentation.

Statistical analysis was descriptive in nature. Continuous variables are presented as mean (range) or median (interquartile range [IQR]), as appropriate, whilst categorical variables are presented as

frequencies and percentages. A 95% confidence interval (CI) was calculated for the primary outcome (change in management) using the Wilson score method.

The distribution of BCVA was assessed using the Shapiro–Wilk test. As BCVA data were non-normally distributed, paired comparisons between presentation and follow-up BCVA were performed using the Wilcoxon signed-rank test.

Exploratory univariable analyses were performed to assess associations between presenting clinical characteristics and subsequent visual outcomes or complications. Associations between continuous variables and follow-up BCVA were assessed using Spearman's rank correlation, whilst categorical predictors were compared using the Mann–Whitney U test. Associations between categorical presenting features and subsequent complications were assessed using Fisher's exact test. Multivariable modelling was not performed because of the small number of outcome events.

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 29.0 (IBM Corp., Armonk, NY, USA).

Results

Patient characteristics:

A total of 53 patients diagnosed with commotio retinae were included in this study. The mean age at presentation was 28.7 years (range 9–64 years), with a predominance of male presentations (43/53, 81.1%). The median time from injury to presentation was 1 day (range of 0–6 days). Macular involvement was documented in 7 patients (13.2%), whilst 39 patients (73.6%) had peripheral commotio retinae. The location was not specified in the remaining 7 patients (Table 1).

Mechanism of injury:

The most common mechanisms of injury were punch/assault (13/53, 24.5%) and football-related trauma (11/53, 20.8%), followed by tennis ball injuries (4/53, 7.5%), shuttlecock injuries (3/53, 5.7%) and NERF gun injuries (2/53, 3.8%). Other less common mechanisms included squash ball injuries, falls, finger injuries, workplace trauma and blunt trauma from miscellaneous objects.

Associated ocular injuries:

Associated ocular injuries were common at presentation; only 13 patients had isolated commotio retinae. Traumatic iritis was the most frequently observed associated finding (22/53, 41.5%), followed by subconjunctival haemorrhage, corneal abrasion, retinal haemorrhage, hyphaema or microhyphaema, and orbital fracture (Table 2). A small number of patients had significant pre-existing ocular pathology including glaucoma (n = 1) and keratoconus (n = 1).

Follow-up outcomes:

The 53 patients generated a total of 121 outpatient appointments, corresponding to a mean of 2.28 visits per patient. Eighteen patients were discharged following their first review appointment. Routine follow-up resulted in a change in management in only one patient (1.9%, 95% CI 0.3% to 9.9%) (Table 3).

The patient requiring intervention had significant associated ocular trauma at presentation, including an orbital fracture. A retinal tear with vitreous haemorrhage was subsequently identified during scheduled follow-up and treated with laser retinopexy following vitreoretinal referral.

Complications during follow-up, defined as any new ocular finding or complication recorded by the reviewing clinician at the first or final follow-up review, occurred in 6 patients (11.3%). These comprised raised intraocular pressure with a suspected steroid response (n = 2), a retinal tear with vitreous haemorrhage treated with laser retinopexy (n = 1), vitreous inflammation with a chorioretinal scar adjacent to the fovea and later peripapillary choroidal atrophy (n = 1), retinal dot haemorrhages with a superonasal visual field defect (n = 1) and angle recession (n = 1).

Seventeen patients (32.1%) did not attend at least one scheduled follow-up appointment. Of these, four patients were discharged to out-of-area follow-up. No subsequent adverse ophthalmic events or commotio-related re-presentations were identified within the available clinical records among patients who did not attend scheduled follow-up. Two patients (3.8%) were discharged directly from eye casualty without planned review. No subsequent adverse ophthalmic events or commotio-related re-presentations were identified in the available clinical records for these patients.

Among 33 patients with documented retinal findings at first follow-up, commotio retinae had completely resolved in 22 (66.7%) and improved in a further 9 (27.3%), with persistent commotio retinae documented in only 2 patients (6.1%). Overall, 31 of 33 patients (93.9%) demonstrated anatomical resolution or improvement at first follow-up. Patients requiring additional follow-up frequently had associated ocular injuries necessitating continued or subspecialty review.

Visual outcomes:

Best-corrected visual acuity (BCVA) was available for 52 patients at presentation, 35 at first follow-up and 13 at final follow-up. Of the 35 patients with BCVA recorded at first follow-up, one lacked a presenting BCVA measurement; therefore, 34 patients had paired measurements available for analysis. Median BCVA was 0.00 logMAR (IQR 0.00 to 0.18) at presentation, 0.00 logMAR (IQR 0.00 to 0.18) at first follow-up and − 0.08 logMAR (IQR − 0.08 to 0.00) at final follow-up. BCVA data were non-normally distributed (Shapiro–Wilk test, $p < 0.01$ for all time points); therefore, paired comparisons were performed using the Wilcoxon signed-rank test.

Among 34 patients with paired BCVA measurements at presentation and first follow-up, BCVA did not show evidence of a statistically significant change ($p = 0.158$). Among 13 patients with paired BCVA

measurements at presentation and final follow-up, median BCVA was 0.00 logMAR (IQR 0.00 to 0.18) at presentation and − 0.08 logMAR (IQR − 0.08 to 0.00) at final follow-up (p = 0.012). The difference in medians (0.08 logMAR) is less than one logMAR line, and patients with final follow-up measurements may not be representative of the whole cohort; this result should therefore be interpreted with caution. The median time from presentation to final follow-up in these 13 patients was 63 days (range 17 to 366). The distribution of BCVA across the three time points is shown in Fig. 1.

Predictors of visual outcome and complications:

On exploratory univariable analysis, worse presenting BCVA was associated with worse BCVA at the last available follow-up (final follow-up BCVA where recorded, otherwise first follow-up BCVA; Spearman ρ = 0.42, p = 0.013; n = 34). No statistically significant associations were identified between follow-up BCVA and age, SUN grading classification of anterior chamber cells, presenting IOP, macular involvement or individual associated ocular injuries. Patients who developed a complication during follow-up had a higher presenting IOP than those who did not (median 16.5 vs 12.0 mmHg; p = 0.010), although both medians lie within the normal range and, given the number of comparisons performed, this may be a chance finding. No other presenting characteristic was significantly associated with subsequent complications. Retinal haemorrhage demonstrated a non-significant association with increased odds of complications (odds ratio [OR] 7.17; 95% CI 0.84 to 60.79; p = 0.104). Given the small number of complication events and wide confidence interval, these findings should be considered exploratory.

Discussion

This retrospective case series suggests that routine follow-up after uncomplicated commotio retinae rarely altered clinical management. Only one patient (1.9%) required a change in management during follow-up, despite the cohort generating 121 outpatient appointments. Among patients with documented retinal findings at first follow-up, 93.9% demonstrated anatomical resolution or improvement. Among 13 patients with paired BCVA measurements, median BCVA was marginally better at final follow-up than at presentation (p = 0.012).

These findings are consistent with those reported by Zhou et al. [12], who retrospectively reviewed 201 patients with commotio retinae. Of the 201 patients, 142 (70.6%) attended follow-up, generating 254 outpatient visits. Only 4 patients (2.8%) developed retinal tears during follow-up, with just one patient (0.7%) progressing to retinal detachment. The authors therefore concluded that retinal complications following uncomplicated commotio retinae were infrequent and that routine follow-up had limited clinical utility in asymptomatic patients without concerning clinical features, whilst highlighting the considerable healthcare costs associated with repeated outpatient surveillance.

Similarly, Park et al. [13] evaluated 9 eyes with isolated commotio retinae and reported complete clinical resolution in all patients after a mean follow-up of 26 days. Although 3 eyes demonstrated outer retinal

abnormalities on SD-OCT at presentation, these resolved completely during follow-up, with no persistent functional deficits detected on visual field testing or multifocal electroretinography.

In contrast, a conference abstract by Adams et al. [14] reported that approximately 4% of patients with commotio retinae subsequently developed retinal detachment, highlighting that delayed sight-threatening complications can occur. Nevertheless, the reported absolute risk remains low, with 96% of patients not developing this complication. Importantly, our findings suggest that clinically significant complications were uncommon, with only a single patient (1.9%) requiring intervention. Notably, the only patient requiring a change in management had significant associated ocular trauma at presentation, supporting the principle that follow-up requirements may be driven by co-existing ocular pathology rather than commotio retinae alone.

Furthermore, the available clinical records documented no later adverse ophthalmic events or commotio-related re-attendances among patients who did not attend scheduled follow-up or who were discharged directly from eye casualty without planned review. Although adverse events presenting to other healthcare providers cannot be excluded, this provides further reassurance regarding the favourable clinical course observed in uncomplicated cases.

These findings suggest that whilst delayed complications are possible, they occur infrequently and should be balanced against the significant outpatient burden generated by routine follow-up.

An important finding from our study was that only 13 of the 53 patients presented with isolated commotio retinae, whilst the majority had associated ocular injuries including traumatic iritis, hyphaema, orbital fractures and retinal haemorrhage. Consequently, follow-up decisions were frequently driven by these co-existing injuries rather than the diagnosis of commotio retinae itself. This suggests that management should be individualised according to the overall pattern of ocular trauma rather than commotio retinae in isolation.

Ophthalmology is the highest-volume outpatient specialty in the NHS and continues to experience substantial outpatient demand [15]. Both the Getting It Right First Time (GIRFT) programme [16] and Royal College of Ophthalmologists[17] advocate optimising outpatient pathways and reducing unnecessary follow-up appointments where clinically appropriate to improve capacity and minimise delays for patients at greatest risk of avoidable sight loss. In our cohort, 53 patients generated 121 outpatient appointments despite only 1 patient (1.9%) requiring a change in management. These findings suggest that a more selective approach to follow-up may improve clinic efficiency, reduce unnecessary hospital attendances and minimise inconvenience for patients whilst maintaining patient safety. Comparable conclusions have been drawn in other low-risk ophthalmic settings; for example, Allan et al. reported that conventional routine review may not be necessary after uncomplicated phacoemulsification [10].

Rather than eliminating follow-up altogether, our findings support an individualised risk-stratified approach. Ahn et al. [6] demonstrated that the extent of photoreceptor disruption on SD-OCT correlates

with visual prognosis, suggesting that baseline retinal morphology may help identify patients at increased risk of adverse outcomes. Patients with significant associated ocular co-pathology such as vitreous or retinal haemorrhage, hyphaema, traumatic iritis, traumatic mydriasis or orbital fracture may require follow-up determined by the nature and severity of the co-existing injury. In the absence of such co-pathology, scheduled review may be prioritised for patients with high-risk features, including macular involvement, reduced visual acuity, extensive commotio retinae or persistent symptoms. Conversely, patients with uncomplicated peripheral commotio retinae and no concerning clinical features may be suitable for discharge with clear safety-netting advice and patient-initiated follow-up (PIFU), whereby patients are advised to seek urgent ophthalmic review if they develop new symptoms including flashes, floaters, worsening vision or visual field loss [18]. As part of wider outpatient transformation, NHS England previously set an ambition to reduce outpatient follow-up activity by 25% compared with 2019/20 levels, with PIFU promoted as one approach to reducing low-value routine follow-up whilst preserving capacity for patients with greater clinical need [19]. A proposed risk-stratified follow-up pathway is shown in Fig. 2.

The strengths of this study include the use of consecutive real-world data from a tertiary ophthalmic emergency department, and follow-up data allowing assessment of both clinical outcomes and healthcare utilisation. To our knowledge, this represents one of the few UK studies evaluating the clinical utility of routine follow-up after commotio retinae.

However, several limitations should be acknowledged. This was a retrospective, single-centre study with a relatively small sample size, limiting the ability to detect rare complications or identify independent predictors of poor outcome. Furthermore, patients with significant ocular pathology that independently determined subsequent management were excluded; therefore, the findings are primarily applicable to patients without such injuries. In addition, the high rate of non-attendance also limits complete ascertainment of outcomes and may introduce attrition bias. However, no subsequent commotio-related adverse events or re-presentations were identified within the available clinical records among patients who did not attend scheduled review. This further supports the need to evaluate whether scheduled follow-up represents the most appropriate use of outpatient resources in uncomplicated cases. Visual outcome data were also incomplete at later follow-up, with final BCVA available for only 13 patients, introducing the possibility of attrition bias and limiting interpretation of longitudinal visual outcomes.

Exploratory analysis identified associations between presenting BCVA and subsequent visual acuity, and between presenting IOP and subsequent complications. However, the small number of outcome events limits the reliability of these estimates and precluded meaningful multivariable modelling. Larger prospective multicentre studies are therefore required to validate these associations and determine whether additional features, including macular involvement, SUN grading and associated ocular injuries, can be incorporated into a robust risk-stratification pathway.

Conclusion

This study demonstrated that routine follow-up after uncomplicated commotio retinae rarely resulted in changes in management despite generating substantial outpatient activity. Most patients with documented follow-up demonstrated anatomical resolution or improvement, whilst only one patient required intervention. These findings support further evaluation of a risk-stratified approach, whereby scheduled review is prioritised for patients with high-risk features or significant associated ocular pathology and PIFU with appropriate safety-netting is considered for selected low-risk patients. Larger prospective multicentre studies are required to validate clinical risk factors and establish evidence-based follow-up pathways for patients presenting with commotio retinae.

Declarations

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Conflict of Interest

The authors declare no competing interests.

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There was no funding for this study.

Data Availability

The data generated and analysed during the current study are available from the corresponding author upon reasonable request.

Author Contribution Statement

PB was responsible for data analysis and writing the manuscript. ARR was responsible for design of the study, data collection and interpretation, and contributed to writing of the manuscript. SWC was responsible for the conception of this study, supervision of the project, and critical revision of the manuscript. All authors have read and approved the final version of the manuscript.

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Tables

Tables 1 to 3 are available in the Supplementary Files section.

Figures

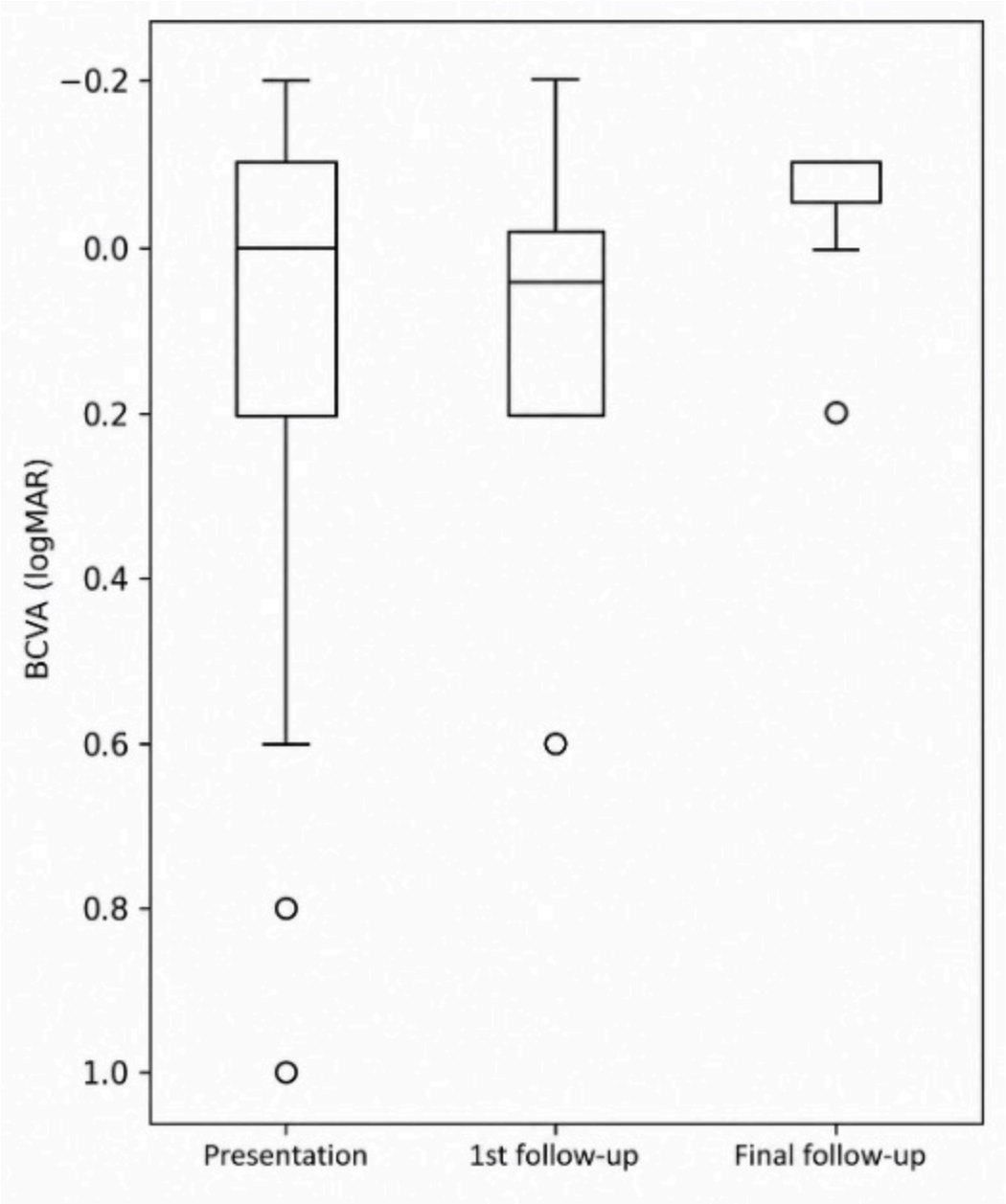


Figure 1

Distribution of best-corrected visual acuity (logMAR) at presentation (n=52), first follow-up (n=35) and final follow-up (n=13). The y-axis is inverted so that better acuity is plotted higher.

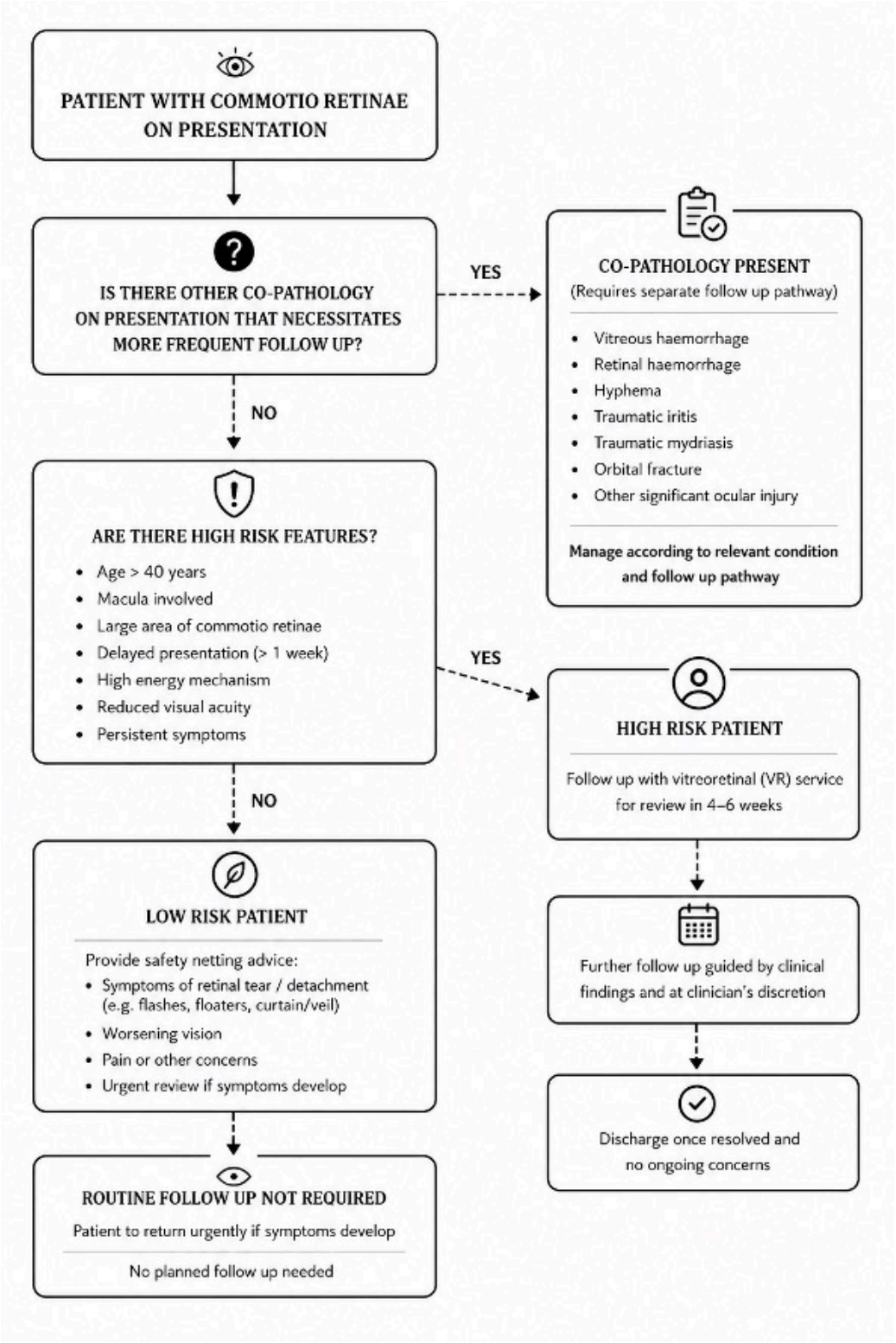


Figure 2

Proposed risk-stratified follow-up pathway for patients presenting with commotio retinae.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Table1.Baselinecharacteristicsxlsx.xlsx
- Table2associatedocularfindings.xlsx
- Table3.Clinicaloutcomesxlsx.xlsx