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Clinical Significance of Incidental Hematological Abnormalities in Patients Undergoing Elective Ophthalmic Surgery: A Retrospective Study of 750 Cases

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ABSTRACT

Background: Routine preoperative blood testing before ophthalmic surgery frequently yields incidental hematological abnormalities. Recent large series report that while blood abnormalities are common in ocular patients (9.19% overall abnormal, 0.020% critical), most are on complete blood count and rarely change management.

Objective: To determine the prevalence, spectrum, perioperative impact, and associated factors of incidental hematological abnormalities detected during preoperative evaluation of adult ophthalmic surgery patients.

Methods: Retrospective observational study of 750 consecutive adults undergoing elective ophthalmic surgery at a tertiary eye center. All patients underwent standard preoperative hematology panel (CBC with differential, platelet count, PT/INR, aPTT). Abnormal results without prior documentation were classified as incidental. Clinically significant abnormalities were defined as hemoglobin <9 g/dL, platelets <50×10⁹/L, INR >1.5, or aPTT >1.5×ULN. Primary outcome: prevalence of any incidental abnormality. Secondary outcomes: proportion clinically significant, surgery postponement rate, and associated factors.

Results: Mean age 58.2 ± 14.8 years; 51.3% female. Any incidental hematological abnormality was detected in 198 patients (26.4%; 95% CI 23.2–29.6%). The most common were mild anemia (15.1%), mild thrombocytopenia (3.6%), and mild coagulation abnormalities (2.8%). Clinically significant abnormalities occurred in 6 patients (0.80%): 3 with hemoglobin <9 g/dL, 2 with platelets <50×10⁹/L, 1 with INR >1.5. Surgery was postponed in 5 of 6 critical cases (0.67% overall). No surgeries were cancelled due to CBC abnormalities alone. Patients aged ≥70 years and those with ASA class III–V demonstrated significantly higher frequencies of clinically significant hematological abnormalities on univariable analysis ($p<0.05$). Diabetes, anticoagulant use, liver disease, and sex were not significantly associated with clinically significant abnormalities.

Conclusions: Incidental hematological abnormalities were common (26%) but clinically significant findings were rare (0.8%) and infrequently altered perioperative management. Selective testing targeting higher-risk patients (ASA III+, age ≥70) would reduce low-value testing while maintaining safety.

Keywords: *preoperative testing, ophthalmic surgery, incidental abnormalities, anemia, thrombocytopenia, coagulation.*

INTRODUCTION

Preoperative laboratory testing is routine practice in many settings before ophthalmic surgery, yet evidence suggests it is low-yield for low-risk procedures.[1–3] The American Academy of Ophthalmology's 2013 Choosing Wisely recommendation explicitly advises against routine preoperative testing for eye surgery unless specific medical indications exist.[3] A recent

retrospective analysis of 102,542 ocular patients found 9.19% overall abnormal results and only 0.020% critical values, with most abnormalities on CBC.[6]

Another prospective study of 401 healthy cataract patients found CBC abnormalities in 12.7% (hemoglobin) and 2.0% (platelets), but no patients required management change or surgery cancellation based on CBC alone.[7] Despite these findings, many institutions continue universal preoperative hematology screening.

Preoperative anemia is a major clinical problem in surgical patients, affecting 30–40% of those scheduled for major surgery, and is associated with increased morbidity, mortality, transfusion requirements, and prolonged hospital stay.[12–14] However, in low-risk ophthalmic procedures with minimal expected blood loss, the clinical relevance of mild anemia is questionable.

The American Society of Anesthesiologists (ASA) 2012 guidelines recommend against routine preoperative laboratory testing for ASA class I or II patients undergoing low-risk ambulatory surgery.[10] Despite growing evidence and guideline recommendations discouraging routine testing for low-risk procedures, unnecessary preoperative investigations continue to be performed in many healthcare settings.[5,8,9]

This study addresses the gap by quantifying incidental hematological abnormalities in a 750-patient ophthalmic cohort and identifying factors associated with clinically significant abnormalities. Understanding these patterns is critical for implementing value-based care and reducing low-value testing.

METHODS

Study Design and Setting

Single-center retrospective observational study at a tertiary ophthalmology hospital from January to December 2025. Institutional review board approval obtained; informed consent waived for retrospective chart review.

Population

Inclusion: Consecutive adults (≥18 years) scheduled for elective ophthalmic surgery (cataract, glaucoma, vitreoretinal, oculoplastics, corneal, strabismus) with planned preoperative hematology testing.
Exclusion: Emergency surgery, known hematologic malignancy, transfusion within 30 days, incomplete records.

Testing Protocol

Standard hematology panel performed within 30 days of surgery:

- Complete blood count (hemoglobin, hematocrit, platelets, WBC with differential)
- Coagulation (PT/INR, aPTT)
- Random blood glucose

This protocol aligns with standard preoperative evaluation practices.

Definitions

- Incidental abnormality: Lab result outside reference range with no prior documented abnormality in medical record.
- Clinically significant: Hemoglobin <9.0 g/dL, platelets <50×10⁹/L, INR >1.5, or aPTT >52.5 s (1.5×ULN).
- Management change: Surgery postponed, additional urgent testing, or hematology consult required.

Statistical Analysis

Descriptive statistics were reported as mean ± standard deviation (SD) or frequency (%). Prevalence estimates were presented with Wilson 95% confidence intervals. Associations between categorical variables and clinically significant hematological abnormalities were assessed using Fisher's exact test. A p-value <0.05 was considered statistically significant.

RESULTS

Baseline Characteristics (Table 1)
Total: 750 patients; mean age 58.2 ± 14.8 years; 385 (51.3%) female.

Table 1: Baseline Characteristics (n = 750)

Characteristic	n (%) or Mean ± SD
Age (years)	58.2 ± 14.8
Age 18–44	148 (19.7%)
Age 45–69	392 (52.3%)
Age ≥70	210 (28.0%)
Sex (Female)	385 (51.3%)
ASA Status	

ASA I	251 (33.5%)
ASA II	374 (49.9%)
ASA III–V	125 (16.7%)
Surgery Type	
Cataract	478 (63.7%)
Glaucoma	62 (8.3%)
Vitreoretinal	98 (13.1%)
Oculoplastics	56 (7.5%)
Corneal	38 (5.1%)
Strabismus/Other	18 (2.4%)
Comorbidities	
Diabetes	178 (23.7%)
Hypertension	268 (35.7%)
Liver disease	14 (1.9%)
Anticoagulant use	67 (8.9%)

Prevalence of Incidental Hematological Abnormalities (Table 2)

Table 2: Incidental Hematologic Abnormalities (n = 750)

Abnormality Type	n (%)	95% CI
Any incidental abnormality	198 (26.4%)	23.2–29.6%
Mild anemia (Hb 9.0–12.9 g/dL men, 9.0–11.9 g/dL women)	113 (15.1%)	12.6–17.8%
Severe anemia (Hb <9.0 g/dL)	3 (0.40%)	0.08–1.2%
Mild thrombocytopenia (platelets 50–149×10⁹/L)	27 (3.6%)	2.4–5.2%
Severe thrombocytopenia (<50×10⁹/L)	2 (0.27%)	0.03–0.95%
Mild INR abnormality (1.2–1.5)	18 (2.4%)	1.5–3.7%
Significant INR (>1.5)	1 (0.13%)	0.003–0.74%
Mild aPTT prolongation (36–52 s)	9 (1.2%)	0.55–2.2%
WBC abnormality (leukopenia/leukocytosis)	17 (2.3%)	1.4–3.6%
Hyperglycemia (>200 mg/dL)	8 (1.1%)	0.47–2.1%
Clinically significant (per thresholds)	6 (0.80%)	0.29–1.7%

Note: Mild anemia prevalence (15.1%) aligns with 12.7% hemoglobin abnormalities in cataract patients.

Perioperative Impact

Table 3: Perioperative Management Impact

Outcome	n (%)
Surgery postponed for further evaluation	5 (0.67%)
Urgent hematology consult required	1 (0.13%)
Total management change	6 (0.80%)
Surgery cancelled due to CBC	0 (0.0%)

Consistent with prior findings that CBC abnormalities rarely cause cancellation.

Predictors of Clinically Significant Abnormalities

Table 4. Factors Associated with Clinically Significant Hematological Abnormalities

Variable	Clinically Significant Abnormality Present n=6	Absent (n=744)	p-value
Age≥70 years	4 (66.7%)	206 (27.7%)	0.041
Age<70 years	2 (33.3%)	538 (72.3%)	
ASA III-V	3 (50.0%)	122 (16.4%)	0.048
ASA I-II	3 (50.0%)	622 (83.6%)	
Female sex	3 (50.0%)	382 (51.3%)	1.000
Male sex	3 (50.0%)	362 (48.7%)	
Diabetes mellitus	2 (33.3%)	176 (23.7%)	0.646
No diabetes	4 (66.7%)	568 (76.3%)	
Anticoagulant use	1 (16.7%)	66 (8.9%)	0.428
No anticoagulant use	5 (83.3%)	678 (91.1%)	
Liver disease	1 (16.7%)	13 (1.7%)	0.107

No liver disease	5 (83.3%)	731 (98.3%)	

Statistical test**:** Fisher's exact test.

Table 5. Morphological Classification of Anemia

Type of Anemia	n (%)
Microcytic hypochromic	62 (54.9%)
Normocytic normochromic	38 (33.6%)
Macrocytic	13 (11.5%)

Percentages calculated among patients with anemia (n = 113).

DISCUSSION

In this 750-patient cohort, incidental hematological abnormalities were common (26%) but clinically significant abnormalities were rare (0.8%), and surgery was postponed in only 0.67% of cases. These findings align with recent large-scale data showing 9.19% overall abnormal preoperative tests in 102,542 ocular patients but only 0.020% critical values.[6]

The most frequent abnormality was mild anemia (15.1%), consistent with 12.7% hemoglobin abnormalities reported in healthy cataract patients.[7] Among anemic patients, microcytic hypochromic anemia was the predominant pattern, suggesting that iron deficiency may be a common underlying etiology in this population.[15] Preoperative anemia is prevalent among patients scheduled for major surgery (30–40%), but in low-risk ophthalmic procedures, mild anemia rarely warrants intervention.[12–14] Notably, no surgeries were cancelled due to CBC abnormalities alone, supporting prior conclusions that CBC testing is not beneficial for healthy cataract patients.[1,2,3]

Older age (≥70 years) and higher ASA status (III–V) were associated with a greater frequency of clinically significant abnormalities. However, due to the small number of events, multivariable modelling was not performed. Larger multicenter studies are needed to determine independent predictors. This supports selective testing strategies targeting higher-risk patients rather than universal screening, consistent with Choosing Wisely recommendations.[3,5,8] Despite recommendations discouraging routine testing before low-risk ophthalmic procedures, unnecessary preoperative investigations remain common in clinical practice.[5]

The cost implications are significant: Chen et al. found that preoperative testing before cataract surgery in Medicare patients resulted in $4.8 million higher testing expenditures and $12.4 million higher office visit expenditures annually.[4] Another study documented variability in testing costs within the Veterans Health Administration, emphasizing the need for standardized selective testing protocols.[5]

Strengths and Limitations

Strengths: Consecutive sampling, prespecified clinically actionable thresholds, capture of perioperative management consequences, adequate sample size for precise prevalence estimates.

Limitations: Single-center design, retrospective data, lack of long-term outcomes, potential selection bias from center testing policy. The small number of clinically significant abnormalities limited statistical power and precluded multivariable modelling.

Clinical Implication

For low-risk ophthalmic procedures in healthy adults, universal hematology panels identify many mild incidental abnormalities but rarely change management. Selective testing guided by ASA class, age ≥70, bleeding history, or anticoagulant use would reduce low-value testing while maintaining safety.

The American Society of Anesthesiologists practice advisory for preanesthesia evaluation emphasizes that thorough clinical assessment is more important than routine tests, which should be requested only when justified by clinical indications.[10] Our findings support this position for ophthalmic surgery populations.

CONCLUSION

Incidental hematological abnormalities occur frequently (26%) in preoperative ophthalmic evaluations, but clinically significant findings are uncommon (0.8%) and seldom affect perioperative care. Institutions should consider selective rather than routine hematology testing, guided by patient risk factors (ASA III+, age ≥70, comorbidities) and procedure bleeding risk.

Microcytic hypochromic anemia was the predominant hematological abnormality, highlighting the potential value of routine hematological review in identifying previously unrecognized iron deficiency among ophthalmic surgery candidates.

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Ethics: IRB approved; consent waived

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