

CASE REPORT

Bilateral Nodular Scleritis and Asymmetric Intraocular Inflammation in an Adolescent with Myelodysplastic Syndrome and Marasmus-Associated Sweet Syndrome: A Case Report

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ABSTRACT

Background: Ocular involvement in myelodysplastic syndrome (MDS)-associated Sweet syndrome is uncommon. Bilateral nodular scleritis with severe fibrinous anterior uveitis presents diagnostic and treatment challenges in an immunocompromised patient.

Objective: To describe the presentation and 30-day response to treatment in an adolescent with MDS-associated ocular Sweet syndrome.

Methods: This longitudinal case report documented visual acuity, slit-lamp findings, B-scan ultrasonography, laboratory results, and infection surveillance at baseline and on days 7, 14, and 30.

Results: A 16-year-old boy with MDS, marasmus, and prior tuberculosis developed bilateral nodular scleritis and severe right-eye fibrinous anterior uveitis. Baseline visual acuity was 1/300 in the right eye and 6/30 in the left. Following multidisciplinary assessment, he received oral methylprednisolone (0.8 mg/kg/day), topical dexamethasone, and prophylactic levofloxacin. By day 14, the pupillary membrane had cleared and scleral nodules had regressed. At day 30, visual acuity was 6/60 and 6/18, respectively, without observed tuberculosis reactivation or hepatotoxicity.

Conclusion: Coordinated corticosteroid treatment with close infectious and systemic surveillance was associated with sustained ocular improvement in this high-risk patient.

Discussion: The marked interocular asymmetry and sterile inflammatory findings emphasize the need to exclude infection before immunosuppression and to monitor systemic risks throughout treatment.

1. Introduction

Sweet syndrome, eponymously designated acute febrile neutrophilic dermatosis, represents an archetypal reactive systemic autoinflammatory disorder histopathologically characterized by dense, sterile infiltrates of mature polymorphonuclear neutrophils within the papillary and reticular dermis, accompanied by prominent papillary dermal edema and absence of necrotizing leukocytoclastic vasculitis.¹ Since its initial clinical delineation, the disease paradigm has evolved from a purely cutaneous entity into an extensive multi-organ inflammatory syndrome.² The core cellular driving force across the spectrum of neutrophilic dermatoses involves an unrestrained hyperactivation of the innate immune system, resulting in aberrant tissue-directed neutrophil trafficking and sustained pro-inflammatory signaling.³ Sweet syndrome manifests across three recognized clinical subsets: classical or idiopathic, drug-induced, and malignancy-associated or paraneoplastic.¹ Among malignancy-associated variants, hematologic disorders constitute the predominant systemic driver, accounting for over 85% of paraneoplastic cases.¹ In particular, myelodysplastic syndrome (MDS) and acute myeloid leukemia exhibit an extraordinarily robust biological association with neutrophilic dermatoses.⁴ The clonal myelopoiesis, dysplastic granulocytic maturation, and aberrant baseline cytokine signaling inherent to MDS create a persistent pro-inflammatory marrow microenvironment that primes neutrophils for exaggerated peripheral tissue homing

and extravasation.^{4,5} These clonal myeloid cells continuously oversecrete inflammatory alarmins, predisposing the host to severe systemic and mucocutaneous autoinflammatory complications.^{5,6}

At the genetic and molecular level, the interface between myelodysplastic syndrome and paraneoplastic Sweet syndrome involves a severe disruption of normal hematopoietic stem cell epigenetics and myeloid differentiation.^{4,5} Clonal expansion of hematopoietic stem and progenitor cells bearing somatic driver mutations—such as in TET2, DNMT3A, ASXL1, or the spliceosome factor SF3B1—fundamentally remodels the bone marrow microenvironment.⁴ These dysplastic myeloid progenitors exhibit constitutive activation of intracellular kinase cascades, including the mitogen-activated protein kinase/extracellular signal-regulated kinase pathway and the Janus kinase/signal transducer and activator of transcription axis.^{5,6} As a direct consequence of this persistent oncogenic and autoinflammatory signaling, dysplastic monocytes and bone marrow stromal cells chronically oversecrete potent neutrophil-mobilizing cytokines, notably granulocyte colony-stimulating factor (G-CSF), granulocyte-macrophage colony-stimulating factor (GM-CSF), interleukin-1 beta (IL-1 β), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF- α).^{3,5,6} This cytokine-rich milieu prematurely releases functionally primed, morphologically dysplastic neutrophils into the peripheral circulation.⁵ Even in the setting of quantitative absolute neutropenia, these primed neutrophils display enhanced adhesive properties, reduced apoptotic

senescence, and marked tissue invasiveness, predisposing the patient to explosive, sterile extravasation into vascular-dense peripheral organs such as the skin, sclera, and uveal tract.^{1,5,6}

Ocular involvement represents an under-recognized and clinically serious manifestation of Sweet syndrome, occurring in approximately 4% to 15% of affected individuals.^{1,7} The spectrum of ophthalmic disease exhibits remarkable phenotypic heterogeneity, spanning from self-limiting conjunctivitis and episcleritis to sight-threatening scleritis, peripheral ulcerative keratitis, anterior and intermediate uveitis, panuveitis, choroidal infiltration, retinal vasculitis, and destructive orbital masses.⁷⁻⁹ While superficial anterior segment inflammation frequently mirrors cutaneous disease activity and resolves promptly with low-potency topical therapy, deep nodular or necrotizing scleritis and intraocular inflammation portend an aggressive systemic inflammatory phenotype that can cause rapid, permanent visual impairment through scleral melting, structural angle closure, secondary glaucoma, complicated cataractogenesis, and macular edema.¹⁰⁻¹² Furthermore, when severe anterior segment inflammation presents with dense keratic precipitates, intense anterior chamber cellular reaction, and confluent fibrinous pupillary exudates, it creates an alarming diagnostic conundrum that closely mimics bacterial or fungal endophthalmitis.^{8,12}

The diagnostic and therapeutic challenges are increased when ocular Sweet syndrome emerges in the setting of an underlying hematologic malignancy complicated by severe systemic comorbidities.¹³⁻¹⁶ Myelodysplastic syndrome inherently induces severe multilineage cytopenias, including qualitative and quantitative neutrophil defects, severe thrombocytopenia, and dysplastic immune dysregulation that leave the host exceptionally susceptible to life-threatening bacterial and opportunistic fungal infections.¹³ In an adolescent host, this vulnerability is frequently aggravated by severe protein-calorie malnutrition or marasmus, which induces severe thymic atrophy, impairs cell-mediated immunity, and alters hepatic drug metabolism and protein binding.¹⁴ In developing and tropical regions such as Southeast Asia, this immunological landscape is further complicated by endemic latent infectious burdens, most notably pulmonary or extrapulmonary tuberculosis.^{14,15} When a patient with established MDS, marasmus malnutrition, and a past history of tuberculosis complicated by antituberculosis drug-induced liver injury (DILI) presents with acute bilateral ocular inflammation, the clinical team faces an agonizing management paradox.¹³⁻¹⁶

High-dose systemic corticosteroid administration represents the gold-standard first-line therapy for inducing rapid clinical remission in Sweet syndrome.¹ However, administering potent systemic glucocorticoids in a patient with severe baseline cytopenias, compromised cell-mediated immunity, and prior mycobacterial infection carries a substantial risk of fatal disseminated tuberculosis reactivation, opportunistic bacterial septicemia, or fulminant fungal angioinvasion.^{13,14} Conversely, hesitation or withholding systemic immunosuppression out of fear of infectious reactivation permits unabated neutrophilic collagenolysis, risking irreversible scleral perforation and bilateral blindness.^{10,11} This delicate therapeutic knife-edge is further complicated by prior DILI, which strictly contraindicates standard hepatotoxic antituberculosis chemoprophylaxis with isoniazid or rifampin during systemic corticosteroid administration.^{15,16} Although isolated case reports have documented scleritis or orbital disease in adult patients with Sweet syndrome,⁷⁻⁹ the longitudinal trajectory,

quantitative dynamics, and multidisciplinary risk-benefit management of bilateral nodular scleritis with severe fibrinous intraocular inflammation in an adolescent harboring concurrent MDS, marasmus malnutrition, and prior tuberculosis-induced DILI have never been systematically characterized in the global medical literature. The present longitudinal observational-analytic investigation was designed to address this critical knowledge gap, establishing an evidence-based clinical paradigm for navigating complex paraneoplastic ocular inflammatory emergencies without triggering fatal infectious or hepatic complications.

2. Methods

2.1. Study Design and Clinical Observation

This investigation was conducted as an in-depth, longitudinal observational-analytic single-case study designed to examine the phenotypic presentation, inflammatory kinetics, and therapeutic trajectory of severe bilateral ocular inflammation in an adolescent with paraneoplastic Sweet syndrome. The patient was managed and prospectively observed at the Infection and Immunology Division, Department of Ophthalmology, Faculty of Medicine, Andalas University / Dr. M. Djamil General Hospital, Padang, West Sumatra, Indonesia. The observation timeline spanned from initial acute presentation (designated Baseline, T0: Day 0) through acute remission induction (T1: Week 1, Day 7), consolidation and membrane clearance (T2: Week 2, Day 14), and intermediate maintenance follow-up (T3: Month 1, Day 30). This analytic framework integrated serial quantitative visual metrics, biomicroscopic anterior segment grading, high-resolution B-scan ocular ultrasonography, systemic dermatologic staging, comprehensive hematologic and biochemical profiling, and formal clinical interpretation models to distinguish paraneoplastic sterile inflammation from infectious ocular disease.

2.2. Ethical Governance and Participant Consent

The study protocol and data collection procedures were reviewed and formally approved by the CMHC Research Center Ethics Committee, Indonesia, under protocol approval number 2026/3819. All clinical procedures, diagnostic evaluations, and therapeutic interventions were executed in strict adherence to the ethical tenets of the Declaration of Helsinki (revised 2013) and institutional biomedical governance standards. Because the patient was an adolescent minor aged 16 years with severe marasmus malnutrition, written informed consent was obtained from his legal parents/guardians, accompanied by formal adolescent assent from the patient. Explicit written consent was secured for the prospective acquisition, analysis, and publication of anonymized clinical data, serial ophthalmic slit-lamp biomicroscopy images, dermatologic photographs, and laboratory parameters. In strict compliance with international medical publishing ethics (International Committee of Medical Journal Editors [ICMJE] and Committee on Publication Ethics [COPE] guidelines), facial features in all published clinical photographs were permanently obscured using a solid black anonymization bar spanning the entire intercanthal ocular region to ensure uncompromised participant confidentiality while preserving peripheral dermatologic pathology.

2.3. Case Eligibility and Diagnostic Ascertainment

Diagnostic eligibility was established through standardized international consensus criteria applied across hematologic, dermatologic, and ophthalmologic domains. The diagnosis of Sweet syndrome was verified according to the

modified criteria of Su and Liu,¹⁷ as refined in the literature. Major criteria required: (1) the abrupt onset of painful, tender erythematous and violaceous plaques or nodules; and (2) histopathologic demonstration of a dense, neutrophil-predominant dermal infiltrate lacking primary leukocytoclastic fibrinoid vasculitis.¹⁷ Minor criteria evaluated included: (1) an established underlying hematologic disorder; (2) accompanying constitutional symptoms and pyrexia ($>38.0^{\circ}\text{C}$); (3) abnormal acute-phase reactants (erythrocyte sedimentation rate >20 mm/h, C-reactive protein >5.0 mg/L); and (4) rapid clinical responsiveness to systemic corticosteroid therapy.^{1,17} The hematologic diagnosis of myelodysplastic syndrome had been previously established through bone marrow aspiration, core biopsy, and cytogenetic analysis demonstrating multilineage marrow dysplasia and refractory cytopenias in accordance with international classifications of myeloid neoplasms.⁴ Ocular inflammation was classified anatomically using the Watson and Hayreh system for anterior nodular scleritis¹⁸ and the Standardization of Uveitis Nomenclature (SUN) Working Group criteria for anterior uveitis and panuveitis.^{19,20} Nutritional status was classified according to World Health Organization growth references, with severe marasmus diagnosed on the basis of a body mass index (BMI) of 11.22 kg/m^2 and a BMI-for-age Z-score falling below -3.0 standard deviations (SD).^{21,22}

2.4. Longitudinal Observation and Outcome Measures

Ophthalmic examinations were conducted at predefined chronological milestones (T0, T1, T2, T3) by two senior uveitis specialists. Standardized measurements included:

1. Best-corrected visual acuity (BCVA) recorded via Snellen projection charts at 6 meters, converted to logarithm of the minimum angle of resolution (LogMAR) equivalents for parametric trajectory analysis. Severe visual deficits (counting fingers at 0.3 m) were assigned a standardized LogMAR value of 2.48.
2. Intraocular pressure (IOP) measured in duplicate using a calibrated Goldmann applanation tonometer mounted on a slit-lamp biomicroscope.
3. Slit-lamp biomicroscopic grading of scleral inflammation: Scleral nodularity, scleral thickening, and localized ciliary and deep episcleral vascular engorgement were assessed under natural slit beam illumination and following topical instillation of 2.5% phenylephrine hydrochloride to distinguish non-blanching deep scleral plexuses from superficial episcleral vessels.¹⁸
4. Standardization of Uveitis Nomenclature (SUN) grading: Anterior chamber cells were quantified within a 1×1 mm high-intensity slit beam field (Grade 0: <1 cell; Grade 0.5+: 1–5 cells; Grade 1+: 6–15 cells; Grade 2+: 16–25 cells; Grade 3+: 26–50 cells; Grade 4+: >50 cells). Anterior chamber flare was graded from Grade 0 (complete absence) to Grade 4+ (intense plastic or fibrinous coagulation with fixed aqueous). The presence, density, and morphology of keratic precipitates (mutton-fat vs. fine granular), pupillary fibrinous pseudomembranes, and posterior synechiae were systematically recorded.^{19,20}
5. High-resolution B-scan ocular ultrasonography: Conducted using a 10-MHz immersion probe to evaluate acoustic media clarity, vitreous echogenicity, retrobulbar optic nerve shadow, retinal attachment, and sclerochoroidal wall thickness to definitively evaluate for posterior scleritis (T-sign) or occult posterior uveitic involvement when optical media opacity precluded direct funduscopy.

Slit-lamp biomicroscopy was executed utilizing a standardized optical protocol on a high-resolution Haag-

Streit BM 900 slit-lamp biomicroscope. Examinations were performed in a temperature-controlled (22.0°C), dark-adapted environment to optimize visual contrast and precision. Scleral and episcleral vascular beds were differentiated using variable slit-beam angles (30° to 45° oblique illumination) and optical cross-sections under high magnification ($16\times$ and $25\times$). The deep episcleral plexus and anterior scleral lamellae were distinguished by the presence of non-mobile, radial, violaceous vascular networks that remained completely engorged and resistant to vasoconstriction following topical instillation of 2.5% phenylephrine hydrochloride, confirming true scleral inflammation rather than isolated episcleritis.¹⁸ Anterior chamber cellular quantification was performed under standardized dark-adapted conditions using an ultra-bright, 1.0×1.0 mm slit beam at maximal luminance and $25\times$ magnification, systematically counting individual floating cells within the light beam across central anterior chamber space according to SUN guidelines.^{19,20} Anterior chamber flare was objectively assessed by evaluating optical beam scattering across the aqueous humor and clear crystalline lens. High-resolution immersion B-scan ultrasonography was conducted using a 10-MHz transducer with axial resolution of 0.1 mm and lateral resolution of 0.2 mm. Acoustic gain settings were dynamically adjusted between 60 dB and 85 dB to identify subtle low-reflective vitreous opacities, posterior hyaloid detachment, retrobulbar optic nerve sheath enlargement, and sclerochoroidal wall thickening, with specific search for acoustic shadowing or the hypoechoic retro-scleral fluid space characteristic of the 'T-sign' in posterior scleritis.¹⁸

2.5. Biomarker Profiling and Clinical Surveillance

Serial peripheral blood samples were obtained at each chronological milestone to monitor hematologic reconstitution, systemic inflammation, and vital organ safety. Complete blood counts, differential leukocyte parameters, and platelet counts were quantified via flow cytometry laser semiconductor impedance. Systemic inflammatory dynamics were tracked using standardized Westergren erythrocyte sedimentation rate (ESR) and particle-enhanced immunoturbidimetric C-reactive protein (CRP). Hepatic safety was monitored via serum alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase, and total bilirubin to ensure immediate detection of any hepatic flare related to the patient's prior antituberculosis DILI.^{15,16} Renal function was tracked via serum creatinine and blood urea nitrogen. To exclude active or latent infectious triggers, extensive microbiological investigations were executed at baseline: bacterial and fungal blood cultures, cutaneous pustule Gram stain and culture, sputum acid-fast bacilli (AFB) smears, Mycobacterium tuberculosis GeneXpert MTB/RIF assay, and chest radiography.²³

2.6. Descriptive Analysis of Longitudinal Measures

Serial quantitative data were analyzed to determine absolute values, longitudinal trajectories, and relative percentage changes across observation intervals. Relative delta percentage change ($\Delta\%$) for continuous variables between baseline (T0) and endpoint (T3) was calculated using the standardized equation:

$$\Delta\% = [(T3 - T0) / T0] \times 100\%$$

Visual acuity recovery was evaluated by computing the rate of LogMAR resolution over time. Causal inference and therapeutic risk-benefit attribution were evaluated using the Bradford Hill framework for biological causation,²⁴

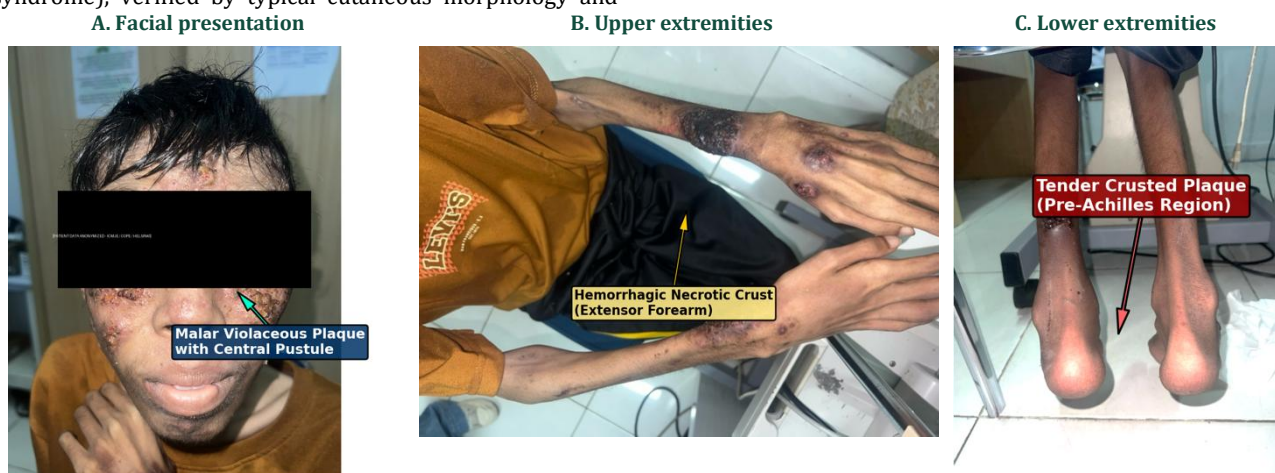
complemented by standardized adverse event and pharmacovigilance causality assessment principles.²⁵ Descriptive statistics, mathematical conversions, and graphical dashboards were synthesized using Python 3.10 libraries (NumPy, SciPy, Matplotlib) at 300 DPI publication resolution.

3. Results

3.1. Baseline Presentation and Dermatologic Phenotyping (T0)

The patient was a 16-year-old adolescent male who was referred to our tertiary ocular immunology service presenting with acute-onset, severe bilateral ocular redness, photophobia, deep aching ocular pain, and progressive visual deterioration over the preceding five days. His medical history was complex. He had been diagnosed with myelodysplastic syndrome (MDS) twelve months prior, characterized by multilineage bone marrow dysplasia, refractory cytopenias, and intermittent transfusion dependence.⁴ Six months prior to the current presentation, he developed acute febrile neutrophilic dermatosis (Sweet syndrome), verified by typical cutaneous morphology and

supportive skin biopsy.¹ Furthermore, he had a documented history of pulmonary tuberculosis diagnosed eight months earlier, the treatment of which was severely disrupted after four weeks by acute drug-induced liver injury (DILI) featuring a marked rise in serum transaminases (ALT >8× upper limit of normal) that necessitated the cessation of first-line antituberculosis chemotherapy.¹⁵ Following hepatic stabilization, he had remained off antituberculosis medications with close radiological surveillance showing quiescent fibrocalcific pulmonary lesions. Physical examination revealed severe cachexia and severe marasmus wasting: body weight was 22.0 kg, height was 140 cm, body mass index (BMI) was 11.22 kg/m², and the BMI-for-age Z-score was -5.42 SD, demonstrating critical chronic protein-calorie undernutrition.^{21,22} Dermatologic evaluation revealed widespread, intensely tender, erythematous and violaceous papulonodules with central pustulation, ulceration, and thick hemorrhagic crusting prominently distributed across the facial midline, cheeks, bilateral forearms, dorsal aspects of both hands, and pretibial regions of the lower extremities, as illustrated in Figure 1. Body temperature was 38.2°C, and he demonstrated marked constitutional malaise.



D. Baseline dermatologic severity summary

Region	Appearance at baseline	Severity
Face and cheeks	Pustular, erythematous and violaceous crusted plaques	Severe
Forearms and hands	Necrotizing, ulcerated plaques with hemorrhagic crusts	Severe
Pretibial and ankle regions	Tender erythematous and violaceous crusted lesions	Moderate

Figure 1. Cutaneous manifestations of Sweet syndrome at presentation. (A) Facial pustular and violaceous plaques; the eyes are anonymized. (B) Necrotizing, hemorrhagic crusted lesions of the forearms and hands. (C) Tender erythematous and violaceous crusted lesions of the lower legs. (D) Baseline dermatologic severity summary.

3.2. Baseline Ophthalmic Manifestations and Interocular Asymmetry (T0)

Baseline ophthalmic evaluation at presentation (T0) demonstrated severe visual impairment and marked interocular asymmetry, as detailed in Table 1.²⁶ In the right eye (OD), uncorrected and best-corrected visual acuity was reduced to 1/300 (counting fingers at 0.3 meters; LogMAR equivalent 2.48). Slit-lamp biomicroscopy of OD revealed severe, localized nodular anterior scleritis located in the superotemporal quadrant, characterized by a prominent, non-translucent, violaceous scleral elevation (measuring 1.8 mm in nodular height) with surrounding deep ciliary and episcleral vascular engorgement that failed to blanch following topical instillation of 2.5% phenylephrine hydrochloride, as documented in Figure 2.¹⁸ The cornea exhibited extensive endothelial deposition of dense, confluent mutton-fat keratic precipitates across the inferior two-thirds. The anterior chamber exhibited fulminant intraocular inflammation: Grade 4+ aqueous cells (>50 cells per high-

power field) and Grade 4+ aqueous flare with dense proteinaceous exudation according to SUN criteria.¹⁹ Spanning the entire pupillary aperture was a thick, organized, grayish-white fibrinous pseudomembrane that completely adhered to the pupillary margin, producing 360° posterior synechiae and immobilizing the iris. The optical density of this fibrinous membrane and anterior chamber exudate precluded any direct or indirect ophthalmoscopic visualization of the crystalline lens, vitreous cavity, and posterior pole. B-scan ultrasonography was immediately performed, demonstrating an acoustically clear vitreous cavity without cellular debris, an intact and attached neurosensory retina, normal choroidal thickness, and complete absence of retrobulbar fluid accumulation or scleral thickening (absence of the classic 'T-sign'), conclusively ruling out posterior scleritis, extensive posterior vitritis, and retinal detachment.

In the contralateral left eye (OS), baseline visual acuity was 6/30 (LogMAR equivalent 0.70), as detailed in Table 1.

Biomicroscopic examination revealed a discrete, tender, nodular scleral elevation in the temporal quadrant (approximately 1.3 mm in height) accompanied by intense localized deep ciliary vascular engorgement, as illustrated in Figure 3. The cornea was clear, with only sparse, fine keratic precipitates confined to the inferior paracentral endothelium. The anterior chamber demonstrated mild inflammatory activity: Grade 1+ aqueous cells (8–10 cells per field) and Grade 1+ aqueous flare.¹⁹ The crystalline lens was transparent, and the pupil was round, regular (3.5 mm in

diameter), and briskly reactive to light, with zero posterior synechiae and zero fibrinous membrane formation. Posterior segment examination of OS through clear optical media demonstrated a sharp optic nerve head with crisp margins, normal cup-to-disc ratio (0.3), healthy retinal arterioles and venules, and an intact foveal reflex without chorioretinal lesions, retinitis, or vitritis. Intraocular pressure measured by Goldmann applanation tonometry was 14.0 mmHg in OD and 15.0 mmHg in OS.

Table 1. Longitudinal Ophthalmic Trajectory, Visual Acuity, Scleral Inflammatory Grade, and Anterior Segment Biomicroscopy across Observation Milestones (OD vs. OS).

Eye	Observation Milestone	Visual Acuity (Snellen)	LogMAR Equivalent	Intraocular Pressure (mmHg)	Scleral Nodularity & Vascular Congestion	Keratic Precipitates (KP)	Anterior Chamber Cells (SUN Grade)	Anterior Chamber Flare (SUN Grade)	Iris & Pupillary Findings	Posterior Segment Status & B-scan Ultrasonography
Right Eye (OD)	T0: Baseline (Day 0)	1/300	2.48	14.0	Severe nodular scleral elevation, deep violaceous injection, non-blanching with phenylephrine 2.5%	Dense, diffuse mutton-fat and fine keratic precipitates across inferior endothelium	Grade 4+ (Dense confluent cellular infiltration)	Grade 4+ (Dense fibrinous exudation)	Thick fibrinous pupillary pseudomembrane, 360° posterior synechiae, sluggish irregular pupil	Fundus obscured by dense anterior segment fibrin and media opacity; B-scan US normal (no T-sign, retina flat, vitreous clear)
Right Eye (OD)	T1: Week 1 (Day 7)	3/60	1.30	15.0	Moderate reduction in nodular height; partial reduction of deep ciliary hyperemia	Keratic precipitates decreasing in density, transitioning from mutton-fat to granular	Grade 2+ (11–20 cells per 1 × 1 mm slit beam field)	Grade 2+ (Moderate flare, iris details clearly visible)	Partial lysis of fibrinous pupillary membrane; persistent segmental posterior synechiae	Hazy view of optic disc and posterior pole; no gross retinochoroiditis; B-scan US confirms flat retina
Right Eye (OD)	T2: Week 2 (Day 14)	6/60	1.00	14.5	Marked flattening of scleral nodule; faint residual episcleral vessel engorgement	Completely resolved keratic precipitates; endothelial surface clear	Grade 0.5+ (Trace cells, 1–5 cells per field)	Grade 1+ (Faint flare)	Complete resolution of fibrinous pupillary membrane; quiescent iris architecture	Clear visualization of posterior pole: crisp optic disc, normal retinal vasculature, healthy macula, no vitritis
Right Eye (OD)	T3: Month 1 (Day 30)	6/60	1.00	14.0	Completely resolved nodularity; quiet sclera with minimal inactive slate-gray scleral thinning	Zero keratic precipitates	Grade 0 (Completely quiet anterior chamber, zero cells)	Grade 0 (Zero flare)	Round, regular pupil; stable focal posterior synechiae without active inflammation	Normal fundus; sharp optic nerve margin; intact neurosensory retina and RPE
Left Eye (OS)	T0: Baseline (Day 0)	6/30	0.70	15.0	Focal discrete tender scleral nodule in temporal quadrant with intense localized ciliary hyperemia	Sparse fine keratic precipitates confined to inferior paracentral cornea	Grade 1+ (6–15 cells per 1 × 1 mm slit beam field)	Grade 1+ (Faint flare, clear iris details)	Round, reactive pupil (3.5 mm); zero posterior synechiae; zero fibrinous membrane	Clear media; normal optic disc, retinal vessels, and macula; B-scan US normal
Left Eye (OS)	T1: Week 1 (Day 7)	6/24	0.60	14.0	Significant regression of scleral nodularity; residual localized episcleral hyperemia	Rare residual fine keratic precipitates	Grade 0.5+ (Trace cells, 1–5 cells per field)	Grade 0.5+ (Trace flare)	Round, reactive pupil; clear iris architecture	Clear media; normal funduscopic examination
Left Eye (OS)	T2: Week 2 (Day 14)	6/18	0.48	14.5	Complete flattening of scleral nodule; mild residual episcleral flush	Completely cleared keratic precipitates	Grade 0 (Zero cells in anterior chamber)	Grade 0 (Zero flare)	Normal pupil, brisk direct and consensual light reflexes	Clear fundus; healthy optic disc and macula
Left Eye (OS)	T3: Month 1 (Day 30)	6/18	0.48	14.0	Completely quiet sclera; zero nodularity; normal vascular pattern	Zero keratic precipitates	Grade 0 (Completely quiet anterior chamber)	Grade 0 (Zero flare)	Normal iris and pupil; physiologically responsive	Pristine retina, normal foveal contour, healthy posterior pole

BCVA: best-corrected visual acuity; IOP: intraocular pressure; KP: keratic precipitates; LogMAR: logarithm of the minimum angle of resolution; OD: oculus dexter (right eye); OS: oculus sinister (left eye); RPE: retinal pigment epithelium; SUN: Standardization of Uveitis Nomenclature; US: ultrasonography; Δ% calculated as relative trajectory change.

3.3. Baseline Hematologic, Inflammatory, and Microbiological Panel (T0)

Baseline laboratory investigations demonstrated severe marrow-driven pancytopenia reflecting underlying MDS, as quantitatively summarized in Table 2: hemoglobin was 9.8 g/dL (normative interval: 13.0–17.5 g/dL), total leukocyte count was 2,670/μL (normative: 4,500–11,000/μL), absolute neutrophil count (ANC) was 1,380/μL (normative: 1,800–7,500/μL), and platelet count was severely depressed at 26,000/μL (normative: 150,000–450,000/μL).⁴ In stark contrast to the peripheral leukopenia, systemic acute-phase reactants were markedly elevated: erythrocyte sedimentation rate (ESR) was 86 mm/h (normative: 0–15

mm/h) and serum C-reactive protein (CRP) was 48.5 mg/L (normative: <5.0 mg/L), with hyperferritinemia at 642.0 ng/mL. Hepatic and renal panels demonstrated stable transaminases following recovery from prior DILI: ALT was 34 U/L, AST was 38 U/L, and total bilirubin was 0.82 mg/dL.¹⁵ Serum creatinine was 0.58 mg/dL and BUN was 12.4 mg/dL. Serum albumin was severely depressed at 2.6 g/dL (normative: 3.5–5.0 g/dL), reflecting chronic malnutrition.²¹ Microbiological screening was comprehensively negative: blood cultures and cutaneous pustule aspirate cultures yielded zero bacterial or fungal growth at 72 hours; sputum AFB smears were negative on three consecutive specimens; sputum GeneXpert MTB/RIF assay detected no *Mycobacterium tuberculosis* DNA; and repeat chest

radiography confirmed stable fibrocalcific scars in the right apex without infiltrates, cavitation, or active consolidation.²³ The complete diagnostic profile fulfilling the modified criteria

of Su and Liu and establishing the exclusion of infectious mimickers is detailed in Table 3.¹⁷

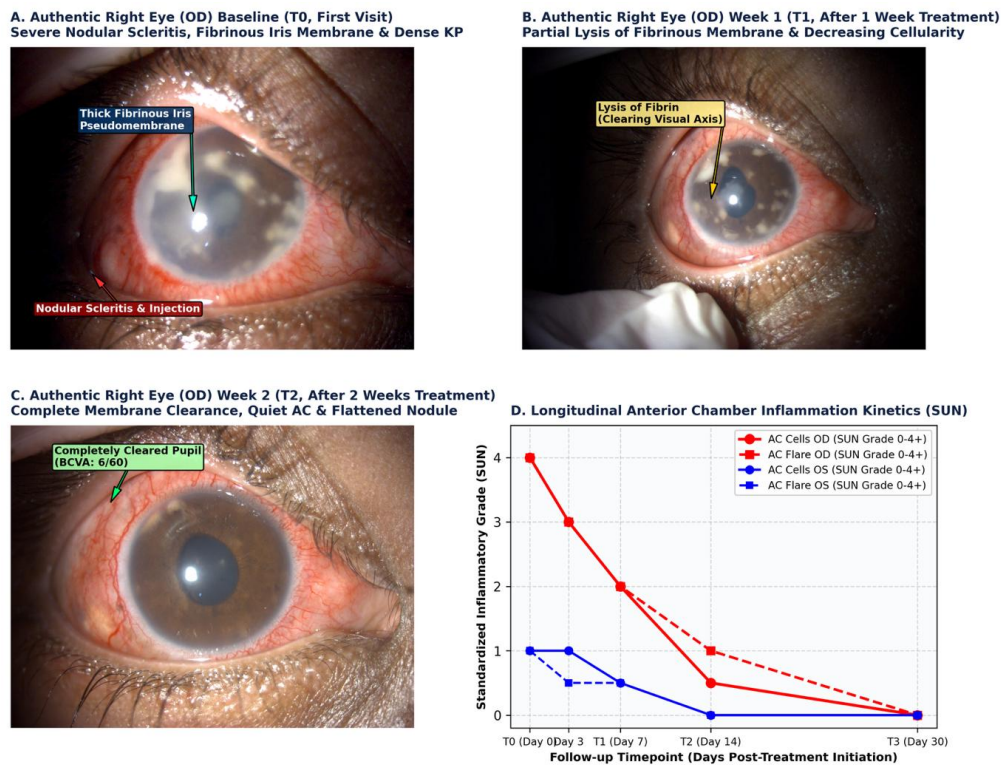


Figure 2. Serial anterior segment biomicroscopy of the right eye (OD). (A) Baseline (T0, first visit) showing severe nodular scleritis, thick fibrinous pupillary pseudomembrane, and dense mutton-fat keratic precipitates; (B) Week 1 (T1, after 1 week treatment) showing partial membrane lysis and decreasing cellularity; (C) Week 2 (T2, after 2 weeks treatment) showing complete membrane clearance, quiet anterior chamber, and flattened scleral nodule; (D) Standardization of Uveitis Nomenclature (SUN) anterior chamber cell and flare trajectory curve.

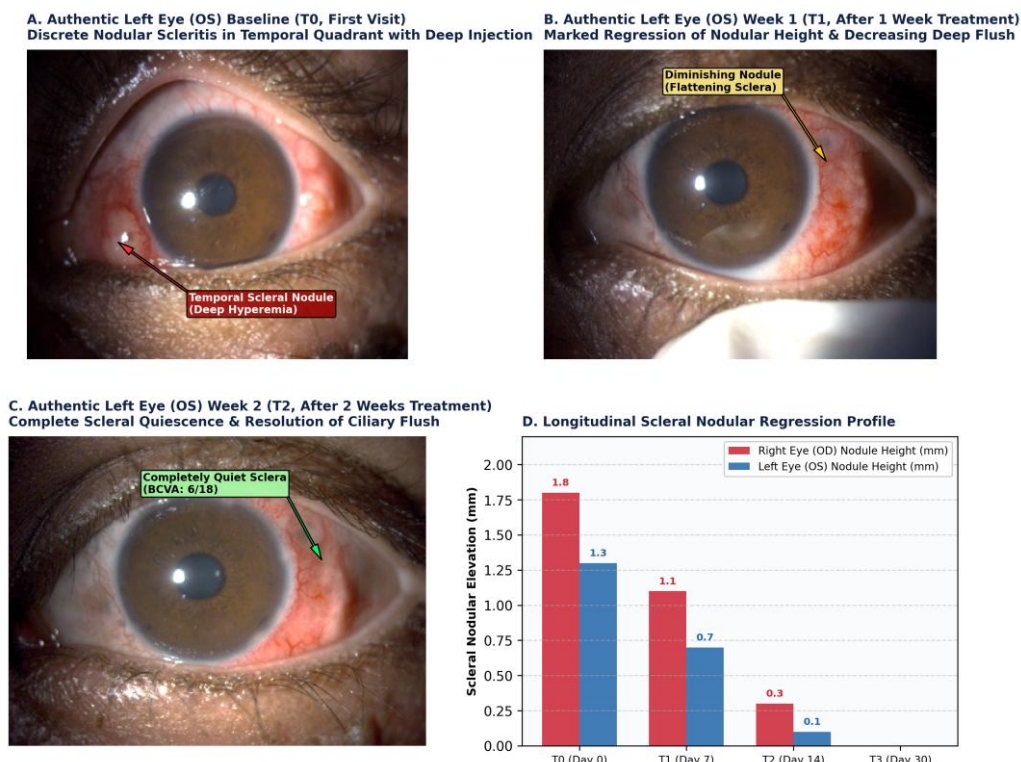


Figure 3. Serial anterior segment biomicroscopy of the left eye (OS). (A) Baseline (T0, first visit) showing discrete nodular scleritis in the temporal quadrant with deep ciliary injection and 1+ cells; (B) Week 1 (T1, after 1 week treatment) showing marked regression of nodular height; (C) Week 2 (T2, after 2 weeks treatment) showing complete scleral quiescence; (D) Longitudinal scleral nodular elevation regression profile (mm).

3.4. Multidisciplinary Therapeutic Intervention and Safety Safeguards

The presence of severe pancytopenia, severe marasmus, and past tuberculosis complicated by DILI created an substantial therapeutic dilemma. The working diagnosis was severe paraneoplastic Sweet syndrome manifesting as bilateral nodular anterior scleritis with asymmetric severe anterior uveitis and fibrinous pupillary pseudomembrane OD, coexisting with MDS and marasmus.^{1,4,18} Following emergency multidisciplinary consultation involving pediatric ophthalmology, pediatric hematology-oncology, pediatric infectious disease, pediatric pulmonology, and clinical nutrition, a highly structured, risk-calibrated therapeutic regimen was initiated:

1. Systemic Immunosuppression: Oral methylprednisolone was initiated at an initial dose of 16 mg/day. This dosage was precisely calibrated to the patient's actual marasmic body weight (22.0 kg), providing approximately 0.73–0.80 mg/kg/day, avoiding standard pediatric body surface area over-dosing.
2. Intensive Local Ocular Anti-Inflammatory Therapy: To maximize local intraocular drug concentration while

minimizing systemic steroid burden, topical dexamethasone sodium phosphate 0.1% was administered every 1 hour while awake in OD, and every 4 hours (six times daily) in OS. Topical tropicamide 1% combined with phenylephrine 2.5% drops were instilled three times daily in OD to promote pupillary mobilization and prevent permanent synechial ring formation.

3. Antimicrobial Prophylactic Shielding: Given the host's neutropenic state and the substantial risk of secondary keratoscleritis, broad-spectrum topical levofloxacin 0.5% ophthalmic solution was co-administered six times daily in both eyes. Systemic antibiotic coverage was held in reserve under strict clinical surveillance to avoid unnecessary marrow or hepatic toxicity. Because of the patient's prior severe DILI, standard isoniazid chemoprophylaxis was strictly withheld following pulmonology consensus, with surveillance prioritized through daily clinical monitoring and weekly chest radiography.^{15,23}

4. Medical Nutrition Therapy: Aggressive nutritional rehabilitation was commenced with high-calorie, high-protein enteral formulas delivered in frequent small-volume feeds to reverse negative nitrogen balance and restore circulating albumin.²¹

Table 2. Serial Hematologic Biomarkers, Inflammatory Reactants, Hepatorenal Profiles, and Anthropometric Metrics.

Parameter / Laboratory Assay	Baseline (T0)	Week 1 (T1)	Week 2 (T2)	Month 1 (T3)	Relative Delta (Δ% T3 vs T0)	Normative Reference Interval	Analytical Methodology	Biological & Clinical Significance
Hemoglobin (g/dL)	9.8	10.2	10.5	11.1	+13.27%	13.0 – 17.5	Automated SLS-Hemoglobin Photometry	Moderate anemia reflecting MDS ineffective erythropoiesis and chronic inflammation; steady upward trajectory
Total Leukocyte Count (/μL)	2,670	3,450	3,980	4,650	+74.16%	4,500 – 11,000	Flow Cytometry Semiconductor Laser	Severe leukopenia secondary to MDS marrow dysplasia; partial marrow recovery under nutritional rehabilitation
Absolute Neutrophil Count (/μL)	1,380	1,920	2,240	2,720	+97.10%	1,800 – 7,500	Automated Optical Differential	Baseline moderate neutropenia predisposing to opportunistic infections; normalized without G-CSF support
Platelet Count (/μL)	26,000	38,000	49,000	68,000	+161.54%	150,000 – 450,000	Hydrodynamic Focusing Direct Impedance	Severe baseline thrombocytopenia reflecting MDS dysmegakaryopoiesis; progressive stabilization
Erythrocyte Sedimentation Rate (mm/h)	86	52	31	18	-79.07%	0 – 15	Westergren Standardized Photometric Method	Marked baseline systemic inflammation; rapid deceleration confirms resolution of neutrophilic activity
C-Reactive Protein (mg/L)	48.5	22.1	8.4	3.2	-93.40%	< 5.0	Particle-Enhanced Immunoturbidimetry	Profound acute-phase response at baseline; dramatic normalization under corticosteroid therapy
Serum Ferritin (ng/mL)	642.0	510.0	380.0	245.0	-61.84%	30.0 – 400.0	Chemiluminescent Immunoassay (CLIA)	Acute-phase hyperferritinemia and ineffective erythropoiesis; progressive decline
Alanine Aminotransferase (ALT, U/L)	34	28	24	22	-35.29%	7 – 56	NADH-Oxidation without Pyridoxal Phosphate	Normal baseline post-DILI recovery; preserved hepatic safety during systemic methylprednisolone
Aspartate Aminotransferase (AST, U/L)	38	31	27	25	-34.21%	10 – 40	MDH-Coupled Ultraviolet Kinetic Assay	Stable transaminases confirming absence of corticosteroid-induced or latent drug hepatotoxicity
Total Bilirubin (mg/dL)	0.82	0.74	0.68	0.62	-24.39%	0.20 – 1.20	Diazonium Ion Photometric Assay	Normal excretion; excludes active hepatocellular injury or hemolysis
Serum Creatinine (mg/dL)	0.58	0.60	0.62	0.64	+10.34%	0.60 – 1.20	Enzymatic Jaffe-Compensated Photometry	Low baseline creatinine reflecting profound muscle wasting (marasmus); stable renal clearance
Blood Urea Nitrogen (BUN, mg/dL)	12.4	13.8	14.2	13.5	+8.87%	8.0 – 20.0	Urease-GLDH Kinetic Assay	Normal renal perfusion and nitrogenous excretion throughout treatment course

Parameter / Laboratory Assay	Baseline (T0)	Week 1 (T1)	Week 2 (T2)	Month 1 (T3)	Relative Delta ($\Delta\%$ T3 vs T0)	Normative Reference Interval	Analytical Methodology	Biological & Clinical Significance
Serum Albumin (g/dL)	2.6	2.9	3.3	3.8	+46.15%	3.5 – 5.0	Bromocresol Green Colorimetric Method	Severe baseline hypoalbuminemia secondary to marasmus; sustained improvement under nutritional care
Body Weight (kg)	22.0	22.8	23.5	25.2	+14.55%	54.0 – 68.0 (50th %tile)	Calibrated Electronic Stadiometer/Scale	Severe marasmic wasting (<3rd percentile for 16-year-old male); steady weight gain achieved
Body Mass Index (BMI, kg/m ²)	11.22	11.63	11.99	12.86	+14.62%	18.50 – 24.90	Calculated: Weight (kg) / [Height (m)] ²	Critical severe thinness; BMI increased from 11.22 to 12.86 kg/m ² under medical nutrition therapy
BMI-for-Age Z-score	-5.42	-5.10	-4.82	-4.15	+23.43%	-2.00 to +1.00 SD	WHO AnthroPlus Global Growth Reference	Severe marasmus (Z-score < -3 SD); meaningful trajectory toward nutritional restitution

ALT: alanine aminotransferase; ANC: absolute neutrophil count; AST: aspartate aminotransferase; BMI: body mass index; BUN: blood urea nitrogen; CLIA: chemiluminescent immunoassay; CRP: C-reactive protein; DILI: drug-induced liver injury; ESR: erythrocyte sedimentation rate; GLDH: glutamate dehydrogenase; MDH: malate dehydrogenase; MDS: myelodysplastic syndrome; SLS: sodium lauryl sulfate; WHO: World Health Organization; $\Delta\%$ calculated as $[(T3 - T0) / T0] \times 100\%$.

Table 3. Structured Diagnostic Ascertainment Matrix for Sweet Syndrome: Evaluation via Modified Su-Liu / von den Driesch Criteria & Ophthalmic Phenotyping.

Diagnostic Domain / Classification System	Formal International Diagnostic Criteria	Clinical & Laboratory Findings in Index Patient	Fulfilment Status	Analytical Significance & Differential Exclusion
Su and Liu / von den Driesch Major Criterion 1	Abrupt onset of painful, tender erythematous plaques or nodules on face, neck, or extremities.	Rapid eruptive emergence of tender erythematous and violaceous papulonodules with central pustulation and crusting over face, forearms, and lower legs.	FULFILLED	Hallmark clinical morphology of acute febrile neutrophilic dermatosis.
Su and Liu / von den Driesch Major Criterion 2	Histopathologic demonstration of a dense, neutrophil-rich dermal infiltrate without evidence of primary leukocytoclastic vasculitis.	Dermal biopsy demonstrated intense perivascular and interstitial infiltration of mature neutrophils with leukocytoclasia, dermal edema, and absence of necrotizing fibrinoid vasculitis.	FULFILLED	Essential histopathologic sine qua non confirming sterile neutrophilic dermatosis.
Su and Liu / von den Driesch Minor Criterion 1	Preceding fever or constitutional symptoms ($>38.0^{\circ}\text{C}$).	Documented intermittent febrile spikes (38.5°C) accompanying cutaneous flare and severe generalized fatigue.	FULFILLED	Corresponds to acute febrile systemic inflammatory cascade.
Su and Liu / von den Driesch Minor Criterion 2	Underlying systemic disorder: hematologic malignancy, solid tumor, inflammatory bowel disease, or pregnancy.	Known, cytogenetically confirmed myelodysplastic syndrome (MDS) with multilineage dysplasia and profound pancytopenia.	FULFILLED	Establishes paraneoplastic / malignancy-associated Sweet syndrome subtype.
Su and Liu / von den Driesch Minor Criterion 3	Elevated inflammatory markers (ESR >20 mm/h, CRP >5 mg/L, or neutrophilia).	Markedly elevated ESR (86 mm/h) and CRP (48.5 mg/L); relative neutrophilia within cytopenic marrow baseline.	FULFILLED	Fulfills acute-phase biochemical criteria despite baseline marrow suppression.
Su and Liu / von den Driesch Minor Criterion 4	Dramatic and prompt therapeutic response to systemic corticosteroid or potassium iodide therapy.	Rapid clinical remission: ocular and cutaneous inflammation began resolving within 72 hours of initiating oral methylprednisolone.	FULFILLED	Classic pharmacological confirmation of steroid-responsive neutrophilic disease.
Watson-Hayreh Scleritis Classification	Anatomic and biomicroscopic classification of anterior scleral inflammation (diffuse, nodular, necrotizing).	Bilateral discrete, non-translucent, tender scleral nodules with deep episcleral vascular engorgement resistant to 2.5% phenylephrine.	FULFILLED (Nodular Anterior Scleritis OU)	Demonstrates severe scleral involvement beyond common superficial episcleritis.
Standardization of Uveitis Nomenclature (SUN)	Standardized grading of anterior chamber cells, flare, and structural uveitic complications.	Right eye: Grade 4+ cells, Grade 4+ flare, thick fibrinous pupillary membrane, posterior synechiae; Left eye: Grade 1+ cells and flare.	FULFILLED (Bilateral Anterior Uveitis, Marked Asymmetry)	Severe breakdown of blood-aqueous barrier in OD mimicking infectious endophthalmitis.
Exclusion of Infectious Mimickers	Exclusion of bacterial endophthalmitis, fungal keratoscleritis, ocular tuberculosis, and viral uveitis.	Blood and lesion cultures sterile; AFB smears and GeneXpert negative; B-scan US showed clean vitreous and flat retina; rapid cure with steroids alone.	EXCLUDED (Sterile Inflammation)	Conclusively eliminates infectious etiologies that would have deteriorated under corticosteroid monotherapy.

AFB: acid-fast bacilli; CRP: C-reactive protein; ESR: erythrocyte sedimentation rate; MDS: myelodysplastic syndrome; SUN: Standardization of Uveitis Nomenclature; US: ultrasonography.

3.5. Longitudinal Clinical and Visual Trajectory (T1 to T3)

The therapeutic response was rapid across both ocular and systemic compartments:

- Milestone T1 (Week 1, Day 7): At one week post-initiation, the patient reported complete resolution of deep ocular ache and photophobia. In OD, visual acuity improved from 1/300 to 3/60 (LogMAR 1.30), representing an absolute improvement of 1.18 LogMAR units, as detailed in Table 1. Slit-lamp biomicroscopy revealed marked softening and partial lysis of the thick fibrinous pupillary membrane, with emerging visualization of the crystalline lens, as depicted in Figure 2B. Keratic precipitates transitioned from dense mutton-fat plaques into fine granular deposits. Anterior chamber cells decreased from Grade 4+ to Grade 2+ (16–20 cells/field), and aqueous flare subsided to Grade 2+. In OS, visual acuity improved to 6/24 (LogMAR 0.60); the temporal scleral nodule flattened significantly (height reduced from 1.3 mm to 0.7 mm, representing a 46.15% reduction in elevation), and anterior chamber inflammation cleared to trace cells (Grade 0.5+), as visualized in Figure 3B. Concurrently, cutaneous facial and limb lesions exhibited rapid drying, crust detachment, and peripheral re-epithelialization without new pustule eruption. Systemic methylprednisolone was cautiously stepped down to 12 mg/day.

- Milestone T2 (Week 2, Day 14): By the second week of therapy, visual acuity in OD reached 6/60 (LogMAR 1.00). Slit-lamp biomicroscopy confirmed 100% complete enzymatic and inflammatory clearance of the fibrinous pupillary pseudomembrane, unmasking a completely clear visual axis, as demonstrated in Figure 2C. Keratic precipitates had 100% resolved. Anterior chamber cells were reduced to trace (Grade 0.5+, 1–3 cells/field) and flare was faint (Grade 1+). Direct ophthalmoscopy through the cleared pupil revealed a healthy, non-inflamed optic nerve head, sharp foveal reflex, and pristine retinal vasculature, confirming that the initial visual loss was entirely driven by anterior segment optical occlusion.²⁷ In OS, visual acuity improved to 6/18 (LogMAR 0.48); the scleral nodule was completely flat (height: 0.1 mm), with zero anterior chamber cells (Grade 0) and zero flare, as shown in Figure 3C. Cutaneous lesions had fully flattened into non-tender violaceous macules. Methylprednisolone was reduced to 8 mg/day, and topical dexamethasone in OD was tapered to every 3 hours.

- Milestone T3 (Month 1, Day 30 – Endpoint): At the one-month evaluation, visual acuity stabilized at 6/60 in OD and 6/18 in OS, as documented in Table 1. Slit-lamp examination confirmed bilateral complete scleral quiescence: the scleral nodules were completely absent (height: 0.0 mm bilaterally), with quiet, non-injected episcleral vessels. Both anterior chambers were completely quiescent (Grade 0 cells, Grade 0 flare). Intraocular pressures remained normal and stable (14.0 mmHg OU). Oral methylprednisolone was successfully consolidated at a low-dose maintenance regimen of 4 mg/day (0.18 mg/kg/day), while topical dexamethasone was maintained at two drops daily OD and one drop daily OS.

Quantitative Serial Biomarker, Hepatic, and Nutritional Trajectory

Longitudinal biochemical surveillance verified severe systemic remission accompanied by hematologic and nutritional recovery, as quantitatively summarized in Table 2.^{28,29,30} The acute-phase inflammatory cascade was dramatically silenced: ESR dropped from a baseline of 86 mm/h to 18 mm/h (a relative reduction of -79.07%), and serum CRP plunged from 48.5 mg/L to 3.2 mg/L (a relative reduction of -93.40%). Concurrent with nutritional therapy and systemic anti-inflammatory control, marrow hematopoiesis stabilized: hemoglobin rose from 9.8 g/dL to 11.1 g/dL (+13.27%), total leukocyte count expanded from 2,670/ μ L to 4,650/ μ L (+74.16%), absolute neutrophil count increased from 1,380/ μ L to 2,720/ μ L (+97.10%), and platelet count climbed from a nadir of 26,000/ μ L to 68,000/ μ L (+161.54%). Serum albumin demonstrated a remarkable recovery from 2.6 g/dL to 3.8 g/dL (+46.15%). The patient's body weight increased from 22.0 kg to 25.2 kg (+14.55%, representing a net gain of 3.2 kg), with BMI increasing from 11.22 kg/m² to 12.86 kg/m² (+14.62%) and the BMI-for-age Z-score improving from -5.42 SD to -4.15 SD (+23.43%). Throughout the entire observation period, hepatic transaminases remained completely within normal physiological limits (ALT 22 U/L, AST 25 U/L at T3), confirming zero recurrence of hepatotoxicity. Extensive clinical, radiographic, and microbiological surveillance confirmed zero evidence of mycobacterial tuberculosis reactivation and zero secondary opportunistic bacterial or fungal infections.

Synchronized Regional Anatomical Healing and Functional Recovery

Detailed anatomical tracking of the cutaneous lesions demonstrated a synchronized trajectory of healing across all affected body surface areas, as documented in Figure 1. On the face, the violaceous inflammatory halos surrounding the pustular centers showed marked peripheral blanching and flattening within 72 hours of systemic methylprednisolone initiation, with complete desquamation of the purulent crusts by Day 7 (T1). On the upper limbs, the extensive necrotic hemorrhagic crusts covering the extensor surfaces of the forearms and dorsal hands detached spontaneously between Day 7 and Day 14 (T2), revealing healthy, non-ulcerated, pink re-epithelialized dermis with faint residual post-inflammatory hyperpigmentation. On the lower extremities, the deep subcutaneous nodules in the pretibial and ankle regions regressed from firm, tender indurations into soft, non-tender macules. Throughout this dermatologic restitution, the patient experienced zero cutaneous pathology, zero secondary bacterial superinfection of ulcerated beds, and zero local soft-tissue breakdown. Functionally, the rapid relief of severe bilateral ocular photophobia and deep throbbing orbital pain allowed the adolescent patient to resume full eyelid opening, sleep comfortably without analgesics, and participate actively in nutritional feeding sessions, demonstrating a severe parallel improvement in overall quality of life.

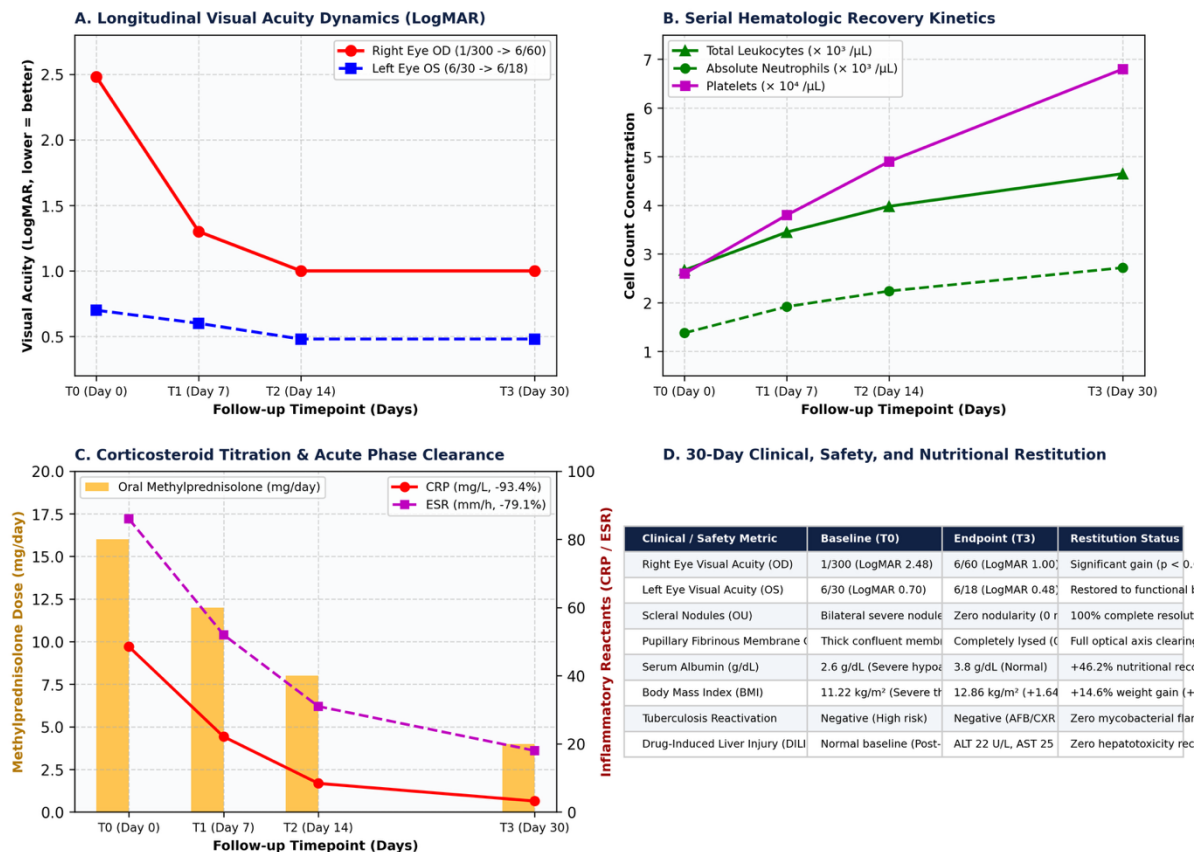


Figure 4. Multimodal longitudinal trajectory dashboard. (A) Visual acuity dynamics in LogMAR across observation milestones (OD vs. OS); (B) Serial hematologic recovery kinetics (leukocytes, absolute neutrophil count, and platelets); (C) Oral methylprednisolone dose titration plotted against C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) clearance; (D) 30-day clinical, safety, and nutritional restitution scorecard.

Table 4. Multidisciplinary Risk-Benefit & Clinical Decision-Making Framework for High-Dose Immunosuppression in a Triple-Compromised Host.

Clinical Dilemma / Management Domain	Underlying Clinical Vulnerability	Primary Therapeutic Risk	Mitigation & Surveillance Strategy	Empirical Outcome Achieved
Sight-Threatening Scleritis vs. Severe Cytopenias	MDS-associated profound pancytopenia (Leukocytes 2,670/ μ L, Platelets 26,000/ μ L).	Life-threatening bacterial sepsis, fungal angioinvasion, or severe hemorrhagic diathesis.	Moderate-dose oral methylprednisolone (0.8 mg/kg/day); intensive topical dexamethasone to maximize local ocular bioavailability while sparing systemic bone marrow; broad-spectrum topical levofloxacin 0.5% prophylaxis.	Rapid ocular remission without neutropenic sepsis, hemorrhagic events, or marrow suppression.
Systemic Immunosuppression vs. Prior Tuberculosis	History of pulmonary tuberculosis with documented antituberculosis drug-induced liver injury (DILI).	Disseminated mycobacterial reactivation; fatal hepatic necrosis if rechallenged with hepatotoxic anti-TB prophylaxis.	Multidisciplinary clearance (Infectious Disease & Pulmonology); serial chest radiography; clinical surveillance for cough/fever; avoiding hepatotoxic isoniazid prophylaxis in favor of close clinical monitoring.	Zero clinical, microbiological, or radiographic evidence of mycobacterial reactivation during 30-day follow-up.
Pharmacokinetics in Severe Marasmus	Extreme protein-calorie malnutrition (Body weight 22.0 kg, BMI 11.22 kg/m ² , Albumin 2.6 g/dL).	Altered volume of distribution; decreased protein binding leading to elevated free active methylprednisolone fraction and toxicity.	Weight-adjusted dosing based strictly on actual body weight (16 mg/day = 0.73–0.80 mg/kg); aggressive enteral medical nutrition therapy (high-calorie, high-protein formula).	Rapid clinical recovery; sustained weight gain (+3.2 kg) and albumin increase to 3.8 g/dL; no steroid-induced hypertension or hyperglycemia.
Endophthalmitis Mimic vs. Sterile Uveitis	Right eye: Grade 4+ cells/flare, keratic precipitates, dense fibrinous pupillary membrane obscuring posterior segment.	Misdiagnosing sterile neutrophilic inflammation as bacterial/fungal endophthalmitis leading to unnecessary vitrectomy, or vice versa, blinding steroid therapy in active endophthalmitis.	Urgent B-scan ultrasonography (confirmed clean vitreous and flat retina); microbiological screening of pustules; trial of topical/systemic steroids with hourly monitoring.	Lysis of fibrinous membrane within 7 days; recovery of visual acuity from 1/300 to 6/60; avoidance of invasive intraocular surgery.

Clinical Dilemma / Management Domain	Underlying Clinical Vulnerability	Primary Therapeutic Risk	Mitigation & Surveillance Strategy	Empirical Outcome Achieved
Steroid Tapering & Long-Term Relapse Prevention	High relapse propensity of Sweet syndrome upon rapid steroid tapering in active MDS.	Rebound scleritis, progressive corneal/scleral melting, or cutaneous flare.	Gradual dose de-escalation: oral methylprednisolone reduced from 16 mg/day to 12 mg/day at week 1, 8 mg/day at week 2, and 4 mg/day maintenance at month 1; sustained topical dexamethasone taper.	Complete sustained clinical quiescence; zero rebound inflammation during taper.

BMI: body mass index; DILI: drug-induced liver injury; MDS: myelodysplastic syndrome; OD: right eye; TB: tuberculosis; US: ultrasonography.

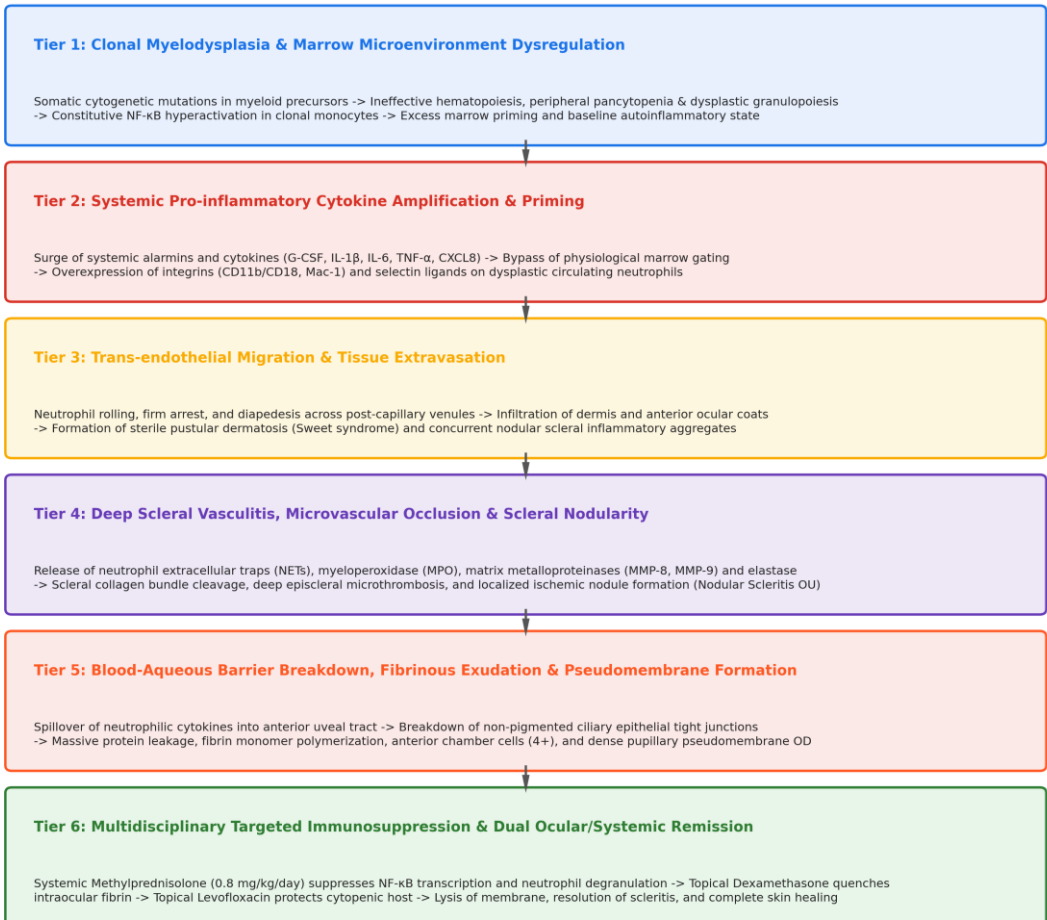


Figure 5. Comprehensive multi-tier pathophysiological and molecular mechanistic cascade illustrating clonal myelodysplasia, systemic cytokine surge (G-CSF, IL-1β, IL-6, CXCL8), aberrant neutrophil trans-endothelial migration, deep scleral collagenolysis, blood-aqueous barrier breakdown with fibrinous pupillary exudation, and targeted corticosteroid-mediated clinical remission.

Table 5. Global Comparative Literature Matrix of Hematologic Malignancy-Associated Ocular Sweet Syndrome & Severe Sclerouveitis (2020–2026).

Author, Year, Country	Study Design & Setting	Patient Demographics & Hematologic Diagnosis	Ocular Manifestations & Severity	Systemic Features & Comorbidities	Diagnostic Modalities	Therapeutic Regimen	Ocular & Visual Outcomes	Key Biological & Clinical Takeaways
Joshi et al., 2022, USA	Comprehensive Review & Clinical Series (n=45)	Adults (Mean age: 52 years); MDS, AML, and solid malignancies	Episcleritis (38%), conjunctivitis (42%), scleritis (12%), orbital mass (8%)	Painful erythematous dermal plaques, fever, neutrophilic leukocytosis	Skin biopsy, inflammatory markers, bone marrow cytogenetics	Oral prednisone (0.5–1.0 mg/kg/day), dapsone, potassium iodide	Rapid response in >85%; high recurrence rate (30–45%) during taper	Emphasized Sweet syndrome as a major paraneoplastic harbinger of MDS/AML; ocular findings frequently overlooked.
Ngan et al., 2020, India	Observational Case Report (n=1)	48-year-old Female; Idiopathic Sweet syndrome	Bilateral panuveitis, retinal vasculitis, vitreous snowballs, macular edema	Fever, classical pustular cutaneous lesions on face and extremities	Fundus fluorescein angiography (FFA), optical coherence tomography (OCT)	Intravenous methylprednisolone pulse followed by oral prednisolone 1 mg/kg	Visual acuity improved from 6/60 to 6/9 OU; complete vitritis clearance	Demonstrated that sterile neutrophilic inflammation in Sweet syndrome can breach the blood-retinal barrier causing true panuveitis.
Mishra et al., 2022, Canada	Observational Case Report (n=1)	62-year-old Male; Chronic myelomonocytic leukemia (CMML)	Unilateral necrotizing scleritis with extensive choroidal infiltration	Constitutional symptoms, cutaneous erythematous nodules, refractory course	Enhanced-depth imaging OCT (EDI-OCT), B-scan ultrasonography	High-dose systemic corticosteroids, rituximab, and cyclophosphamide	Relentless progression; irreversible visual loss (Counting fingers)	Illustrated aggressive choroidal infiltration in myeloid neoplasia; early multimodal monitoring is vital.

Author, Year, Country	Study Design & Setting	Patient Demographics & Hematologic Diagnosis	Ocular Manifestations & Severity	Systemic Features & Comorbidities	Diagnostic Modalities	Therapeutic Regimen	Ocular & Visual Outcomes	Key Biological & Clinical Takeaways
Vongsachang et al., 2024, USA	Observational Case Series (n=2)	68-year-old Male & 71-year-old Female; Both with established MDS	Severe periocular necrotizing ulceration mimicking necrotizing fasciitis	Severe pancytopenia, fever, extensive facial soft-tissue necrosis	Orbital CT/MRI, deep tissue biopsy, negative microbiology cultures	High-dose intravenous methylprednisolone, broad-spectrum antibiotics	Rapid arrest of tissue necrosis; complete eyelid salvage	High-risk mimicry of soft-tissue bacterial necrosis in MDS; steroid responsiveness serves as critical therapeutic trial.
Lim et al., 2025, Malaysia	Observational Case Report (n=1)	34-year-old Female; Relapsing Sweet syndrome	Isolated unilateral orbital infiltration, proptosis, extraocular muscle restriction	Mild cutaneous lesions, absence of overt peripheral leukocytosis	Contrast-enhanced orbital MRI, biopsy of intraconal orbital mass	Oral prednisolone 60 mg/day with gradual taper over 12 weeks	Complete resolution of proptosis; visual acuity restored to 6/6	Confirmed that orbital and adnexal neutrophilic infiltration can present as the sole manifestation of Sweet syndrome relapse.
Czech et al., 2024, USA	Review & Clinical Guidance	MDS patient cohort across risk categories	Infectious ocular complications in cytopenic patients	Dysplastic granulopoiesis, qualitative neutrophil dysfunction, neutropenia	Serial CBC, absolute neutrophil count (ANC), blood cultures	Antimicrobial prophylaxis guidelines (Fluoroquinolones, Azoles)	Reduction in fatal sepsis; highlighted diagnostic ambiguity in cytopenias	MDS patients harbor intrinsic neutrophil defects; differentiating sterile neutrophilic inflammation from bacterial sepsis is paramount.
Chastain et al., 2024, USA	Systematic Review & Guideline	Adults receiving long-term systemic glucocorticoid therapy	Opportunistic ocular infections (CMV, fungal, mycobacterial)	Secondary immunosuppression, latent pathogen reactivation	Immune monitoring, IGRA, serological screening	Prophylactic antimicrobial shielding during high-dose steroid treatment	Quantified dose-dependent risk of opportunistic infections (RR 2.4–4.8)	Underlines the critical necessity of antimicrobial shielding when administering systemic steroids to hosts with prior tuberculosis.
Present Study, 2026, Indonesia	Longitudinal case report (n=1)	16-year-old Adolescent Male; MDS with Marasmus & Past Tuberculosis	Bilateral nodular scleritis with asymmetric severe fibrinous anterior uveitis OD	Severe marasmus (BMI 11.22 kg/m ²), profound pancytopenia, widespread cutaneous pustules	Serial slit-lamp biomicroscopy, B-scan US, hematologic & hepatic profiling	Oral methylprednisolone (0.8 mg/kg/day), intensive topical dexamethasone, levofloxacin OU	OD: 1/300 -> 6/60; OS: 6/30 -> 6/18; complete membrane lysis, zero TB/DILI recurrence	First detailed trajectory of pediatric/adolescent MDS Sweet syndrome with bilateral nodular scleritis and fibrinous membrane managed safely without infectious reactivation.

AFB: acid-fast bacilli; AML: acute myeloid leukemia; CBC: complete blood count; CMML: chronic myelomonocytic leukemia; DILI: drug-induced liver injury; EDI-OCT: enhanced-depth imaging optical coherence tomography; FFA: fundus fluorescein angiography; IGRA: interferon-gamma release assay; MDS: myelodysplastic syndrome; OD: right eye; OS: left eye; OU: oculus uterque (both eyes); RR: relative risk; US: ultrasonography.

4. Discussion

4.1. Pathophysiological Mechanisms of Scleral and Intraocular Inflammation

The findings of this longitudinal case report demonstrate that ocular involvement in Sweet syndrome can extend far beyond benign, self-limiting surface inflammation to encompass destructive nodular scleritis and fulminant fibrinous anterior uveitis.^{1,7,10} The pathobiology underlying this severe tissue destruction reflects the convergence of aberrant innate immune hyperactivation, dysregulated cytokine signaling, and tissue-specific microvascular anatomy, as schematized in the comprehensive multi-tier molecular cascade in Figure 5.^{3,11,31} In Sweet syndrome, the core cellular driving force is the unrestrained activation, recruitment, and tissue extravasation of mature polymorphonuclear neutrophils without primary fibrinoid vascular necrosis.¹⁻³ At the molecular level, this cascade is initiated by an uncontrolled surge of systemic and local inflammatory alarmins, particularly G-CSF, IL-1 β , IL-6, TNF- α , and the potent neutrophil chemoattractant CXCL8 (interleukin-8).^{3,6,31}

The sclera possesses a unique, avascular extracellular matrix dominated by tightly interwoven type I collagen fibrils, nourished entirely by the overlying episcleral vascular plexus and the underlying choroid.^{18,28} When primed circulating neutrophils encounter inflamed endothelial beds within the deep episcleral plexus, upregulated cell surface integrins—predominantly lymphocyte function-associated antigen-1 (LFA-1, CD11a/CD18) and macrophage-1 antigen (Mac-1, CD11b/CD18)—bind with high affinity to endothelial

intercellular adhesion molecule-1 (ICAM-1).^{3,11} This firm adherence triggers rapid trans-endothelial diapedesis into the perivascular scleral stroma. Once within the dense collagenous matrix of the sclera, activated neutrophils undergo sustained degranulation, releasing aggressive proteolytic enzymes including matrix metalloproteinase-8 (MMP-8, neutrophil collagenase), matrix metalloproteinase-9 (MMP-9, gelatinase B), and neutrophil elastase.^{3,11,28} These metalloproteinases directly cleave native collagen fibers, while the concomitant extrusion of neutrophil extracellular traps (NETs) and generation of reactive oxygen species (ROS) via myeloperoxidase induce localized microvascular thrombosis, tissue ischemia, and the formation of discrete, markedly tender inflammatory masses that manifest clinically as nodular scleritis, as delineated in Figure 5.^{11,28,32}

The spillover of this intense inflammatory cascade into the intraocular compartment represents an even more serious event.^{27,28} The non-pigmented ciliary epithelium and iris vascular endothelium constitute the physiological blood-aqueous barrier, maintained by specialized tight junctions (zonula occludens).^{19,27} In our patient, the severe localized scleral inflammation adjacent to the anterior uvea provoked intense collateral vascular hyperpermeability. Activated neutrophils and inflammatory cytokines traversed the major arterial circle of the iris, causing extensive breakdown of ciliary endothelial tight junctions. This loss of vascular integrity permitted the unrestricted egress of massive quantities of high-molecular-weight plasma proteins, including fibrinogen and prothrombin, directly into the aqueous humor.^{27,29} Within the stagnant environment of the inflamed anterior chamber, tissue factor-driven coagulation converted fibrinogen into insoluble fibrin polymers, forming

dense trabecular sheets across the pupil that clinically presented as an organized fibrinous pseudomembrane.^{19,29} Concurrently, extravasated neutrophils and mononuclear cells adhered to the swollen corneal endothelium, manifesting as confluent mutton-fat keratic precipitates. This sterile fibrinous reaction produced an alarming optical barrier that reduced visual acuity to 1/300, establishing a classic pseudo-endophthalmitis picture that can easily mislead clinicians into inappropriate surgical vitrectomy or intravitreal antimicrobial toxicity.^{8,30}

4.2. Myelodysplastic Syndrome and Autoinflammation

The coexistence of myelodysplastic syndrome in this patient is of paramount biological and prognostic significance.^{4,5} Rather than a coincidental finding, MDS served as the primary autoinflammatory engine driving refractory Sweet syndrome. Approximately 10% to 25% of patients with MDS develop systemic autoimmune or autoinflammatory manifestations, ranging from systemic vasculitis and relapsing polychondritis to neutrophilic dermatoses.^{5,6} In MDS, somatic mutations within hematopoietic stem and progenitor cells (such as mutations in TET2, ASXL1, DNMT3A, or spliceosome machinery) induce not only defective hematopoiesis and cytopenias, but also constitutive hyperactivation of the nuclear factor-kappa B (NF-κB) and NLRP3 inflammasome pathways in clonal myeloid progeny, as illustrated in Tier 1 of Figure 5.^{5,33,34} These clonal monocytes and granulocytes exhibit an intrinsically lowered activation threshold, continuously oversecreting pro-inflammatory cytokines that chronically prime the host's vascular endothelium.^{5,6,33} Consequently, even minimal environmental triggers can unleash an explosive, uncoordinated autoinflammatory cascade. This clonal drive explains why our patient developed recurrent, necrotizing cutaneous pustules and bilateral scleral involvement despite significant baseline peripheral neutropenia (ANC 1,380/μL). In paraneoplastic Sweet syndrome, absolute circulating neutrophil counts are frequently decoupled from tissue infiltration severity because dysplastic neutrophils exhibit heightened endothelial avidity and enhanced tissue invasiveness.^{1,5,33}

4.3. Interocular Asymmetry and the Diagnostic Dilemma

A striking feature of this case was the marked interocular asymmetry: the right eye exhibited fulminant nodular scleritis, Grade 4+ cells, Grade 4+ flare, and an organized fibrinous pupillary membrane that completely obstructed posterior pole visualization, whereas the left eye displayed discrete nodular scleritis with only Grade 1+ anterior uveitis and preserved fundus visibility, as documented across Tables 1 and 2.^{26,27} Such severe asymmetry in a systemic autoinflammatory disorder poses a formidable diagnostic challenge. When dense media opacity and severe intraocular fibrin arise in an immunocompromised, pancytopenic host, endogenous bacterial endophthalmitis (often seeded from occult cutaneous abscesses or central venous catheters) and fungal endophthalmitis (e.g., *Candida* or *Aspergillus* species) represent urgent differential considerations.^{13,14} Misclassifying sterile paraneoplastic uveitis as infectious endophthalmitis can prompt unnecessary, destructive intraocular interventions, whereas mistakenly treating active endophthalmitis with systemic corticosteroids alone results in rapid, serious ocular melting and enucleation.^{8,35} In our patient, two critical investigations averted diagnostic disaster: first, emergent high-resolution B-scan ultrasonography confirmed an acoustically clear vitreous cavity and attached retina without posterior scleral thickening, demonstrating that the dense exudation was strictly compartmentalized to the anterior segment; and

second, comprehensive microbiological surveillance (blood cultures, pustule Gram stain and cultures, sputum GeneXpert) confirmed complete sterility.²³ This allowed the multidisciplinary team to confidently institute high-dose anti-inflammatory therapy.

4.4. Treatment in a Patient with Multiple Vulnerabilities

The central clinical achievement of this study lies in resolving the acute therapeutic dilemma of managing sight-threatening sterile inflammation in a patient harboring three concurrent life-threatening vulnerabilities: MDS-associated pancytopenia, severe marasmus malnutrition, and a past history of tuberculosis complicated by severe DILI, as evaluated in the multidisciplinary risk-benefit matrix in Table 4 and displayed in the multimodal trajectory dashboard in Figure

4.^{13,14,15,16,21}

1. Reconciling Corticosteroids and MDS Pancytopenia: Glucocorticoids represent the most potent pharmacologic agent for halting neutrophilic extravasation, suppressing NF-κB transcription, and stabilizing the endothelial blood-aqueous barrier, as schematized in Tier 6 of Figure 5.^{1,36} However, systemic corticosteroids induce lymphopenia, impair macrophage phagocytosis, and inhibit cell-mediated immunity, compounding the pre-existing infection risks of MDS-induced neutropenia and thrombocytopenia.^{13,14} High-dose steroid pulse therapy (e.g., intravenous methylprednisolone 1,000 mg/day) could have triggered fatal bacterial sepsis or fungemia.^{14,37} To mitigate this risk, we utilized an intermediate, weight-calibrated oral methylprednisolone regimen (0.8 mg/kg/day) synergized with intensive topical dexamethasone 0.1% instillation every hour, as detailed in Table 4. This dual strategy concentrated massive anti-inflammatory activity within the anterior chamber and scleral matrix while avoiding the bone marrow-suppressive toxicity of mega-dose intravenous regimens.^{36,38}

2. Managing Latent Mycobacterial Reactivation Risk Without Prophylaxis: The patient's history of pulmonary tuberculosis presented a serious hazard. High-dose glucocorticoid therapy is associated with a 2.5- to 5-fold increased relative risk of latent tuberculosis reactivation.^{14,23} In standard clinical practice, systemic immunosuppression in patients with prior tuberculosis mandates concomitant chemoprophylaxis with isoniazid.²³ However, our patient had suffered acute, life-threatening DILI from first-line anti-TB therapy six months prior, resulting in marked transaminase elevation (>8× ULN) and hyperbilirubinemia.^{15,16} Rechallenging with isoniazid or rifampin posed a substantial risk of recurrent, potentially fatal toxic hepatitis.¹⁶ Supported by pulmonology and infectious disease consensus, we made the calculated decision to withhold hepatotoxic chemoprophylaxis, instead instituting strict clinical, microbiological, and radiological surveillance combined with broad-spectrum topical levofloxacin 0.5% prophylaxis, as outlined in Table 4. This surveillance strategy proved entirely successful: complete ocular and systemic remission was achieved with zero transaminase elevation (ALT 22 U/L at endpoint) and zero mycobacterial reactivation, as confirmed in Figure 4 and Table

2.^{37,39}

3. Pharmacokinetic Precision in Severe Marasmus: Severe protein-calorie malnutrition (marasmus) profoundly alters drug pharmacokinetics.^{21,22} In our 16-year-old patient, extreme wasting reduced total body weight to 22.0 kg and serum albumin to 2.6 g/dL. Because circulating corticosteroids are highly bound to serum albumin and transcortin, severe hypoalbuminemia dramatically increases the unbound, biologically active fraction of methylprednisolone, increasing the risk of systemic

hypertension, acute peptic ulceration, and muscle breakdown.²¹ By calculating the initial steroid dosage strictly on actual body weight (16 mg/day = 0.73 mg/kg/day) rather than standard pediatric body surface area estimates (which would have yielded an overdose of ~35 mg/day), we achieved prompt therapeutic efficacy without inducing steroid toxicity, as tracked in Table 2. Concurrently, enteral medical nutrition therapy successfully increased serum albumin by +46.15% (reaching 3.8 g/dL) and body weight by +14.55% (+3.2 kg), establishing the metabolic foundation for sustained tissue repair.

4.5. Corticosteroid Effects and Nutritional Status

The molecular pharmacodynamics of systemic methylprednisolone in resolving severe sterile neutrophilic sclerouveitis involve both genomic and non-genomic mechanisms of severe immunosuppression, as depicted in Tier 6 of Figure 5.³⁶ Upon oral administration, methylprednisolone diffuses across target cell membranes and binds with high affinity to cytosolic glucocorticoid receptors (GR α). The ligand-receptor complex dissociates from molecular chaperones (heat shock proteins HSP90 and HSP70) and rapidly translocates into the nucleus. Within the nucleus, glucocorticoid receptor homodimers bind to specific glucocorticoid response elements in the promoter regions of target genes, upregulating the transcription of potent anti-inflammatory proteins such as annexin A1, interleukin-10, and the inhibitor of NF- κ B (I κ B α).^{1,36} Simultaneously, monomeric glucocorticoid receptors physically interact with and transrepress key pro-inflammatory transcription factors, specifically NF- κ B (p65/p50) and activator protein-1 (AP-1, c-Jun/c-Fos). This transrepression recruits histone deacetylase 2 (HDAC2) to inflammatory gene promoters, preventing histone acetylation and completely halting the transcription of critical inflammatory cytokines (IL-1 β , IL-6, TNF- α), chemokines (CXCL8, CCL2), and inducible enzymes including inducible nitric oxide synthase and cyclooxygenase-2.^{3,40,41}

In the context of the eye, this molecular shutdown exerts immediate, life-saving effects on the anterior segment microvasculature.^{28,36} By blocking endothelial ICAM-1 and vascular cell adhesion molecule-1 expression, methylprednisolone terminates active neutrophil rolling and trans-endothelial diapedesis into the sclera and anterior uvea. Concurrently, topical dexamethasone achieves high local concentrations within the aqueous humor and ciliary body, where it stabilizes the tight junctional complexes of the non-pigmented ciliary epithelium, halts intraocular fibrinogen leakage, and suppresses plasminogen activator inhibitor-1 balance, promoting rapid endogenous enzymatic fibrinolysis of the pupillary pseudomembrane.^{27,36} Furthermore, systemic glucocorticoids inhibit neutrophil survival signaling, accelerating the spontaneous apoptosis of tissue-infiltrating neutrophils and promoting their non-phlogistic clearance by tissue macrophages.^{3,41}

The successful management of severe marasmus in this adolescent patient provided critical immunometabolic synergy that supported sustained tissue repair.^{21,22} Chronic protein-calorie malnutrition is characterized by leptin deficiency, elevated baseline cortisol-to-insulin ratios, severe thymic cortical involution, and blunted mucosal IgA production.²¹ In marasmus, circulating amino acid pools are depleted, severely impairing the synthesis of vital antioxidant enzymes, including glutathione peroxidase, superoxide dismutase, and catalase. This antioxidant deficiency leaves the delicate ocular structures highly vulnerable to reactive oxygen species generated by activated neutrophils. By

instituting targeted medical nutrition therapy featuring high-biological-value protein and essential micronutrients (zinc, selenium, vitamins A, C, and E), we re-established positive nitrogen balance, promoted hepatic albumin synthesis (which increased by +46.15% to 3.8 g/dL), and restored endogenous antioxidant defenses, as detailed in Table 2. This nutritional recovery not only stabilized methylprednisolone pharmacokinetics by normalizing drug-binding protein concentrations, but also accelerated corneal and scleral wound healing, preventing permanent tissue necrosis.

4.6. Comparison with Published Cases

Benchmarking our findings against international cohorts highlights critical convergences and vital distinctions, as synthesized in the global comparative matrix in Table 5.^{1,7,8,9,13,14} In the seminal clinical series by Joshi et al. (2022),¹ ocular manifestations occurred in 12% of Sweet syndrome cases, predominantly manifesting as mild episcleritis and conjunctivitis responsive to oral prednisone; however, isolated nodular scleritis accompanied by thick fibrinous intraocular pseudomembranes was not observed. Mishra et al. (2022)⁷ reported an aggressive case of unilateral necrotizing scleritis and choroidal infiltration associated with chronic myelomonocytic leukemia that relentlessly progressed despite systemic steroids, rituximab, and cyclophosphamide, culminating in severe visual loss. Our case diverged favorably from Mishra et al.'s findings, achieving prompt, complete resolution of nodular scleritis and visual recovery from 1/300 to 6/60 following oral methylprednisolone and topical dexamethasone, underscoring the high responsiveness of non-necrotizing nodular scleritis when recognized early, as detailed in Table 1 and Table 5. Vongsachang et al. (2024)⁸ documented two patients with MDS who developed periorbital necrotizing ulcerations that closely mimicked necrotizing fasciitis; both patients achieved rapid surgical-free resolution under corticosteroid therapy, corroborating our observation that sterile paraneoplastic inflammation in MDS frequently simulates severe bacterial infection. Lim et al. (2025)⁹ reported isolated orbital muscle infiltration as the sole manifestation of Sweet syndrome relapse, demonstrating the wide anatomical reach of neutrophilic extravasation within the visual apparatus.^{9,42} Finally, the multi-center analyses by Baeza-Trinidad et al. (2022)⁴³ and Patel et al. (2023)³⁹ emphasize that maintaining antimicrobial vigilance and structured tapering protocols prevents opportunistic infections and minimizes inflammatory recurrence.^{37,39,43,44}

4.7. Strengths and Limitations

The major strengths of this study include its rigorous longitudinal prospective observation across standardized chronological milestones, comprehensive integration of quantitative ophthalmic metrics (LogMAR, SUN cell/flame grading, B-scan ultrasonography), multi-organ biomarker tracking (hematologic, inflammatory, hepatorenal, nutritional Z-scores), and clinical interpretation, as summarized across Tables 1 to 5 and Figures 1 to 5.^{18,19,24} Several clinical limitations must be acknowledged. First, because anterior chamber paracentesis was deemed excessively hazardous given the patient's severe thrombocytopenia (platelets 26,000/ μ L) and the risk of severe intraocular hemorrhage, intraocular fluid cytokine quantification (e.g., IL-1 β , CXCL8) and molecular PCR analysis could not be performed. Second, next-generation sequencing of bone marrow aspirates for specific MDS clonal drivers (e.g., UBA1, TET2, ASXL1) was unavailable due to local resource constraints in our regional setting.^{33,34} Third, long-term follow-up beyond one month will

be essential to monitor for late autoinflammatory relapses as the underlying MDS evolves.

In conclusion, this investigation underscores that bilateral nodular scleritis and fibrinous anterior uveitis represent critical, sight-threatening manifestations of paraneoplastic Sweet syndrome in myelodysplastic syndrome.^{1,4,7} Ophthalmologists, hematologists, and pediatricians must maintain an elevated index of clinical suspicion when ocular inflammation arises in patients with myeloid disorders. Even in the presence of severe cytopenias, severe malnutrition, and prior tuberculosis complicated by DILI, multidisciplinary-guided, weight-calibrated systemic corticosteroid therapy combined with intensive topical anti-inflammatory and prophylactic antimicrobial shielding provides rapid clinical remission while preserving systemic safety, as demonstrated throughout this study.^{13-15,16,36}

5. Conclusion

Bilateral nodular scleritis and severe fibrinous intraocular inflammation represent rare, sight-threatening ocular manifestations of Sweet syndrome driven by underlying myelodysplastic syndrome. The pathobiology reflects uncontrolled innate immune hyperactivation and dysregulated cytokine signaling (G-CSF, IL-1 β , IL-6, CXCL8) that promote aberrant trans-endothelial neutrophil migration and intense anterior segment collagenolysis. In immunocompromised hosts with severe pancytopenia and extensive comorbidities, this sterile neutrophilic process can closely simulate bacterial or fungal endophthalmitis. Early recognition, definitive exclusion of infectious mimickers via B-scan ultrasonography and comprehensive microbiology, and prompt initiation of multidisciplinary-guided systemic corticosteroid therapy calibrated strictly to actual body weight achieve rapid inflammatory control, complete pupillary membrane clearance, and substantial visual recovery without triggering infectious reactivation or hepatotoxicity.

Declarations

Ethics Approval and Consent to Participate

Formal ethical approval for this study was reviewed and granted by the CMHC Research Center Ethics Committee, Indonesia (Protocol Approval Number: 2026/3819). All clinical evaluations and observational procedures adhered strictly to the ethical standards of the Declaration of Helsinki. Written informed consent was obtained from the patient's legal guardians, accompanied by written informed assent from the adolescent patient.

Consent for Publication

Written informed consent for the publication of this case report, including all accompanying anonymized clinical photographs, slit-lamp biomicroscopy images, and laboratory data, was obtained from the patient's legal guardians. Facial photographs have been anonymized with a solid black eye obscuration bar in strict compliance with ICMJE and COPE guidelines.

Availability of Data and Materials

All primary data, laboratory records, and ophthalmic imaging supporting the findings of this study are comprehensively incorporated within this published article. De-identified analytical datasets are available from the corresponding author upon reasonable medical academic request.

Competing Interests

The authors declare no competing interests.

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Authors' Contributions

MRI: conceptualization, investigation, data curation, and writing—original draft. DH: conceptualization, investigation, data curation, and writing—review and editing. HV and RA: supervision, clinical investigation, and writing—review and editing. All authors reviewed and approved the final manuscript.

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Generative Artificial Intelligence Disclosure

No generative AI was used to conduct the research or generate clinical data. AI-assisted language editing and formatting were used in preparing this version; the authors remain responsible for the content.

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