Multiple Evanescent White Dot Syndrome (MEWDS) following SARS-CoV-2 infection or vaccination: Clinical observations across 3 cases

Yoon Kit Ivan Lai[1], Pooi Wah Lott[2], Wardati Hanisah Jami[3], Rajasudha Sawri Rajan[1]

ABSTRACT

Purpose: MEWDS is a rare posterior uveitis, typically affecting young myopic females and presents as an acute, unilateral photoreceptor disease with multifocal whitish dots appearing throughout the retina. It is a rare disease and we observe an unusual cluster of MEWDS cases following SARS-CoV-2 infection and vaccination over two months.

Methods: Descriptive Case Series of MEWDS encountered in 2022 at Hospital Selayang, Malaysia. All patients underwent slit lamp examination and multimodal imaging, including fundus photography, SD-OCT, Blue-Light Autofluorescence (BL-FAF), Fundus Fluorescein Angiography (FFA) and Indocyanine Green Angiography (ICGA).

Results: Three cases of MEWDS were encountered, with 2 female and 1 male (2:1). Mean age of presentation was 34 years old. Two patients received SARS-CoV-2 booster vaccination 21 and 28 days prior and one had SARS-CoV-2 infection 26 days before presentation. All had unilateral disease with presenting visual acuity ranging from 6/9 to 6/60. All patients had multiple yellow-white subretinal lesions in their affected eye. Disc hyperemia, mild vitritis and foveal granularity were also present. Multimodal Imaging (MMI) confirmed the MEWDS diagnosis. 2 patients were commenced oral prednisolone due to reduced visual acuity, while 1 patient was treated with topical steroids as visual acuity was unaffected. All patients had full visual recovery by 8 weeks.

Conclusion: Both of our post vaccination patients developed MEWDS following booster dose administration, contrasting with published literature where majority of MEWDS cases occurred with the initial vaccination doses. Given the current evidence, only a temporal association can be inferred with further research required to suggest causality.

Keywords: COVID-19 vaccine, MEWDS, Multiple Evanescent White Dot Syndrome, SARS-CoV-2

INTRODUCTION:

Multiple Evanescent White Dot Syndrome (MEWDS) was initially described in 1984 as a rare posterior uveitis, with the appearance of pale whitish dots in the posterior pole and midperiphery retina.[1,2] Classically, it affects young myopic healthy females in their second to fourth decade of life. Presenting symptoms include sudden unilateral visual loss, scotomas, photopsia and dyschromatopsia.[1]

Up to 50% of MEWDS cases are associated with a prodromal viral flu-like illness and it is considered as a "common cold" of the retina.[1,2] MEWDS has also been described to occur post vaccination, with influenza, rabies, hepatitis A, hepatitis B, meningococcal yellow fever, human papilloma virus and coronavirus-19 vaccinations being implicated.[3] The disease is usually self-limiting with full recovery expected within 7-10 weeks without treatment. Rarely, recovery can be complicated by choroidal neovascularization.[4]

1 Hospital Selayang, Ophthalmology Department, Kuala Lumpur, Malaysia
2 Universiti Malaya, Ophthalmology Department, Kuala Lumpur, Malaysia
3 Universiti Sains Malaysia, Department of Ophthalmology and Visual Science, Kelantan, Malaysia

Received: 13.04.2026
Accepted: 24.08.2026
J Ret-Vit 2026; 35: 304-310
DOI:10.37845/ret.vit.2026.35.39

Correspondence author:
Yoon Kit Ivan Lai
Email: ivanlai1989@hotmail.com

Copyright © 2026 The author(s). This is an open-access article under the terms of the Creative Commons Attribution License (CC BY) which permits unrestricted use, distribution, and reproduction in any medium or format, provided the original work is properly cited.

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the virus implicated in causing coronavirus disease 2019 (COVID-19) and was first identified in Wuhan, China. The disease spread rapidly, leading to a global pandemic with a mass vaccination response. Data from the World Health Organization (WHO) estimates that as of 23 June 2024, globally there have been over 775 million confirmed cases and over 7 million deaths.[5]

Following mass vaccination, further data from WHO estimates that 13.59 billion vaccine doses have been administered. There are 4 main types of COVID-19 vaccines, which are whole virus (Sinopharm, Sinovac, Covaxin), protein subunit (Novavax/NVX-CoV2373, MVC-COV1901), viral vector (AZD1222/ AstraZeneca, Ad26.COV2.S/Johnson Pharm/Covishield) and nucleic acid (RNA and DNA: BNT162b2/Pfizer-BioNTech, mRNA-1273/Moderna).[6] Ocular inflammatory events have been described to occur post vaccination, with anterior uveitis, posterior uveitis and scleritis being the most common events.[7]

During the pandemic, a highly unusual cluster of 3 cases of MEWDS was encountered in a short period of 2 months at Hospital Selayang, Malaysia. A recent history of SARS-CoV-2 vaccination was identified in 2 patients, while 1 patient had SARS-CoV-2 infection. Given the rarity of this condition, where the last identified case of MEWDS in Hospital Selayang was in 2017, this observed cluster of MEWDS cases is of high interest due to the general rarity of this condition and its possible relationship to COVID-19 infection and vaccination.

Another notable strength of this paper is the inclusion of multimodal imaging for all patients, providing clear visual documentation of this rare condition.

METHODS:

A retrospective descriptive case series was conducted with an electronic medical record database search in the year 2022 on patients diagnosed with MEWDS at Hospital Selayang, a tertiary ophthalmology referral centre in Malaysia. The search yielded three patients with a final diagnosis of MEWDS. Patient's data on background, clinical history and laboratory results were retrieved from the electronic record database. The patients diagnosis were made based on the Standardization of Uveitis Nomenclature (SUN) Working Group Classification Criteria for MEWDS.[8]

In 2026, the International Uveitis Study Group's Multimodal Imaging in Uveitis (MUV) Task Force has updated the distinct features of MEWDS against other white dot syndromes with multimodal diagnostic imaging.[9] With the advent of multimodal imaging, the Task Force also suggests that the terminology of white dots syndromes should no longer be grouped under a single classification, but shift towards disease-specific terminology to improve diagnostic accuracy, guide management and reflect the difference in pathophysiology.[9]

Multimodal imaging performed was reviewed and assessed based on the Consensus Based Imaging Guidelines in Multiple Evanescent White Dot Syndrome Multimodal Imaging in Uveitis (MUV) Taskforce Report 6.[10] While informed consent was not required due to the anonymity, all patients gave their permission to be included in the manuscript.

All patients had undergone comprehensive ophthalmologic examination with slit lamp examination and multimodal imaging, including fundus photography, SD-OCT, BL-FAF, FFA and ICGA. Fundus photography were acquired with Zeiss fundus photography machine, whereas the SD-OCT, BL-FAF, FFA and ICGA were acquired with Heidelberg machines. The FAST scan mode was utilized for acquiring numerous SD-OCT scans.

RESULTS:

Among the three patients, there were two female and one male (2:1). Their mean age of presentation was 34 years old. One patient had recent preceding SARS-CoV-2 infection 26 days prior to presentation. Another two patients had recent SARS-CoV-2 vaccination (Pfizer-BioNTech booster dose 28 days and Sinovac booster dose 21 days prior to presentation). All patients did not have prior systemic inflammatory disease or previous uveitic history. Workup was negative in excluding syphilis, tuberculosis and sarcoidosis in all patients.

All patients had unilateral disease. Presenting visual acuity ranged from 6/9 to 6/60. Two patients were myopic. The patient demographics are shown in Table 1.

One patient had anterior chamber activity. Fundus examination showed multiple yellow-white subretinal lesions in all 3 patients. Visible lesions were located around the disc in 1 patient, throughout the posterior pole in 2 patients and midperiphery in all 3 patients. Disc hyperemia was found in 2 patients, mild vitritis in 2 patients and foveal granularity in 2 patients were present. The clinical examination findings are summarized in Table 2. Fundus photography images of each patient are shown in Figure 1, demonstrating yellow-white dots, foveal granularity and disc hyperemia.

Humphrey visual field (HVF) was performed in 2 of the patients. Patient 2 had a normal result while patient 3 had an enlarged blind spot.

Multimodal imaging was performed for all patients. On SD-OCT, all patients had hyporeflective ellipsoid zone (EZ) disruption and interdigitation zone (IZ) disruption.[1,10] The SD-OCT images of each patient are shown in Figure 2.

BL-FAF demonstrated hyper-autofluorescent spots in all patients. This occurs from loss of photoreceptor outer segments causing photopigment density reduction and these lesions co-localize precisely with ICGA hypofluorescence lesions.[4] These lesions are demonstrable in Figure 3.

The classical finding on FFA of "wreath-like" hyperfluorescent lesions with hypofluorescent centers which persists into the late frames was found in all patients.[1,10,11] The lesions were more numerous when compared with the clinical fundus examination. Optic disc leakage was also seen in both patients with optic disc hyperemia and this was demonstrable with FFA.

On ICGA, hypofluorescent lesions demarcating the diseased areas of choriocapillaris hypoperfusion or non-perfusion can be seen.[10,12] All patients had hypofluorescent lesions on ICGA. Figure 4 shows the side-by-side images of FFA and ICGA for each patient.

Multimodal imaging findings and results are summarized in Table 3.

2 patients (patient 2 and 3) were treated with oral prednisolone in view of reduced visual acuity while patient 1 was treated with topical steroids alone as visual acuity was unaffected. Oral prednisolone was started at an immunosuppressive dose of 1mg/kg daily, with 10mg weekly tapering.

All patients had full visual recovery by 8 weeks without sequelae, consistent with the natural history of MEWDS.

Table 1: *Demographic and clinical data*

Patient number	Sex	Age (years)	Viral prodrome/ vaccination	Myopia	Laterality	Presenting visual acuity	Time of presentation	Interval to symptom onset (days)
1	M	32	SARS-CoV-2 Vaccination (Sinovac-CoronaVac booster dose)	Yes	LE	6/9	Feb 2022	21
2	F	41	SARS-CoV-2 Vaccination (Pfizer-BioNTech BNT162b2 mRNA booster dose)	No	RE	6/60	March 2022	28
3	F	29	SARS-CoV-2 Infection	Yes	RE	6/30	March 2022	26

Table 2: *Clinical examination and findings*

Patient number	Anterior chamber activity	Vitritis	Foveal granularity	Hyperemic disc	Subretinal lesions around disc	Subretinal lesions throughout posterior pole	Subretinal lesions at midperiphery
1	-	+	+	+	+	+	+
2	+	-	-	-	-	-	+
3	-	+	+	+	-	+	+

Table 3: *Multimodal imaging findings*

Patient number	SD-OCT (Ellipsoid zone disruption)	BL-FAF (hyperautofluorescence)	FFA (hyperfluorescent lesions)	FFA (optic disc leakage)	ICGA (hypofluorescent lesions)
1	+	+	+	+	+
2	+	+	+	-	+
3	+	+	+	+	+

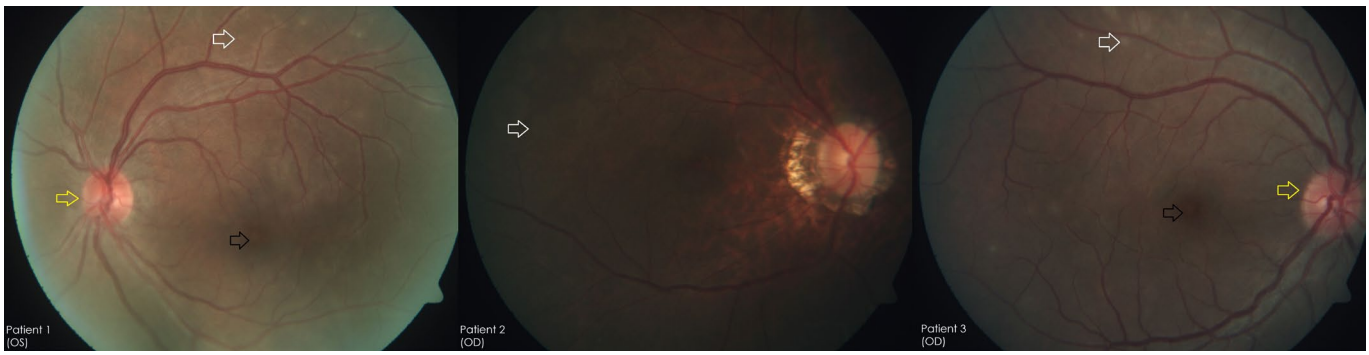

Figure 1. *Fundus photography images of patient 1-3 showing yellow-white dots (50-200 µm) distributed centrifugally from the posterior pole to mid-periphery (white arrows), foveal granularity (black arrows) and disc hyperemia (yellow arrows).*

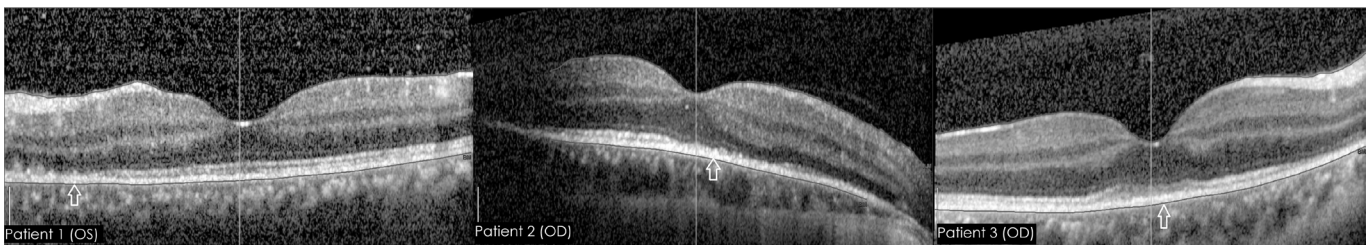

Figure 2. *Spectral Domain-OCT images of patient 1-3 showing hypo-reflective ellipsoid zone (EZ) and interdigitation zone (IZ) disruption (white arrows).*

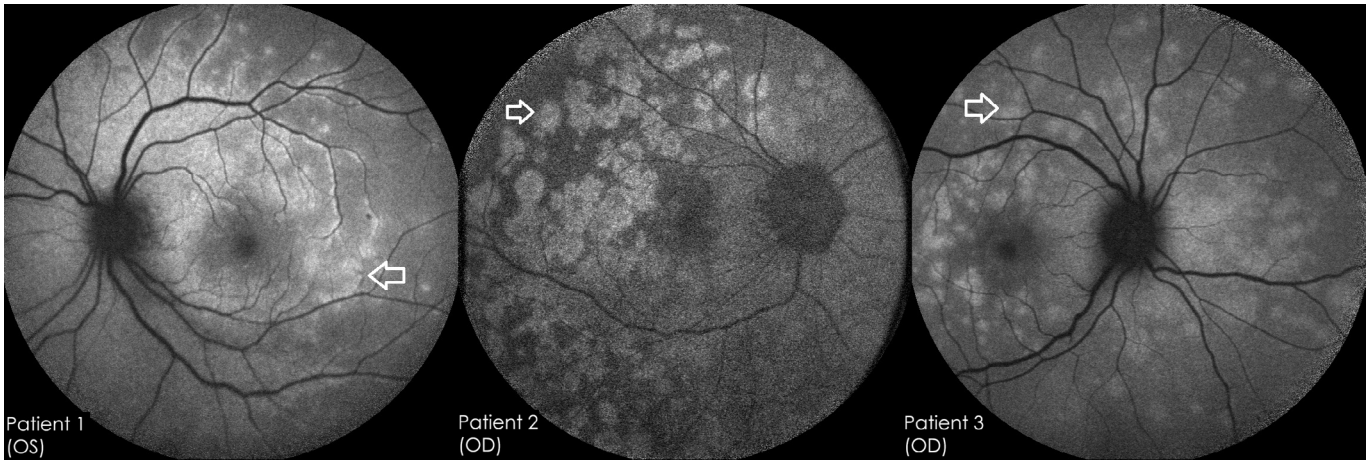

Figure 3: *BL-FAF images of patient 1-3 showing hyperautofluorescent spots (white arrows).*

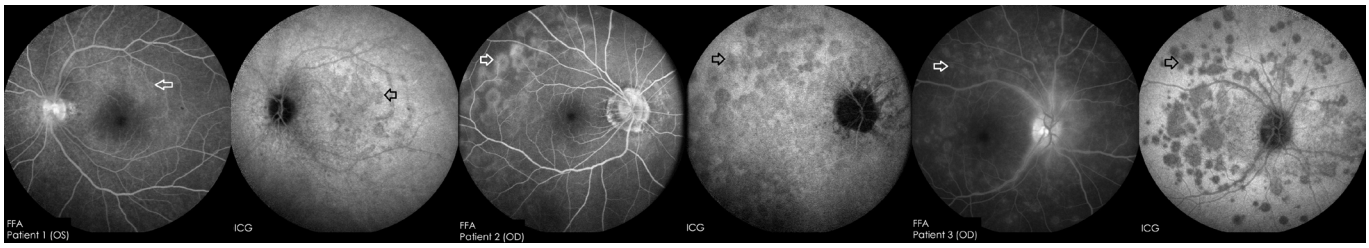

Figure 4: *FFA and ICGA images of patient 1-3. FFA demonstrating "wreath-like" circular hyperfluorescent spots with hypofluorescent centers (white arrows). Optic disc leakage occurred in patient 1 and 3. ICGA demonstrates hypofluorescent lesions that are more numerous than clinical examination and FFA (black arrows).*

DISCUSSION:

MEWDS is considered a rare disease entity with scarce data on its incidence. Previously, a 20 year multi-center retrospective study in Minnesota has described the incidence to be 0.22 per 100,000 per year.[13] It is highly unusual to encounter three cases in a short duration of 2 months in year 2022. These cluster of cases may be related to the SARS-CoV-2 pandemic, with primary infection and the mass vaccination drive contributing to the rise in cases. A retrospective study that compared the incidence of MEWDS during the pre-pandemic period and pandemic period also noted a statistically significant increase of MEWDS cases (0.011% vs 0.030%, p=0.029).[14]

The same study also noted that MEWDS that occurred during the pandemic had a significantly higher proportion of male patients compared to pre-pandemic ($p<0.001$), which suggested that the manifestation of MEWDS during the pandemic may be more diverse and may explain the occurrence of MEWDS in patient 1.[14]

MEWDS is believed to arise post viral infection from immune-mediated responses in genetically susceptible individuals.[15] The inflammatory process develops in the outer retina due to choriocapillary non-perfusion. It is a disease of the photoreceptors and is almost always reversible. The vitreous, RPE and choroid are only secondarily and transiently involved.[16]

SARS-CoV-2 infection causes endothelial cell and pericyte damage by microcirculation disruption, capillary congestion and microthrombosis.[14] Virus particles have also been found in retinas of patients who died from COVID-19.[16]

From the literature, numerous case reports have associated the occurrence of MEWDS post vaccination with

BNT162b2 mRNA (Pfizer), mRNA-1273 (ModernaTX), inactivated Sinovac-CoronaVac vaccine, Medigen and Covishield.[3,6,15,16,17] Our post vaccination patients developed MEWDS post Pfizer and Sinovac-CoronaVac booster dose.

In non-mRNA vaccines, the main mechanism postulated to cause inflammatory responses is via molecular mimicry. Most vaccines target the surface spike glycoproteins as it is easily accessible, while viruses utilize the spike protein for host cell invasion. MEWDS may then result from a hypersensitivity reaction between ocular tissues and translated proteins.[15]

mRNA vaccines encapsulate the mRNA in lipid nanoparticles (LNP) that encode the S-protein of SARS-CoV-2.[17] They are hypothesized to cause MEWDS by increasing type-I interferon secretion, which leads to stimulation of autoimmunity in those with prior history or yet unknown susceptibility.[17]

A recent literature review reported 31 cases of MEWDS following SARS-CoV-2 vaccination.[15] 15 cases presented after the first dose (48%), 14 cases (45%) presented after the second dose and 2 cases presented after the booster dose (6%).[15] Of these 31 patients, Pfizer-BioNTech vaccination (BNT162b2mRNA) had the highest number of reported MEWDS with 16 cases (51%). This was followed by Sinovac-CoronaVac vaccination (whole inactivated vaccine) with 10 patients (32%).[15] This higher number of adverse events from Pfizer-BioNTech vaccine may be attributed to the larger number of doses administered worldwide as well as an additional CD8 T-cell immune response triggering autoimmune reactions.[18] Majority of MEWDS occurred with the first and second dose, and this data contrasts with our patients, where MEWDS occurred after the booster doses of Pfizer-BioNTech and Sinovac-CoronaVac vaccination.

From the literature, SARS-CoV-2 vaccines have been associated with multiple ocular inflammatory diseases such as anterior uveitis, posterior uveitis, panuveitis, multifocal choroiditis, acute zonal occult outer retinopathy (AZOOR), acute macular neuroretinopathy (AMN), anterior scleritis, Vogt-Koyanagi-Harada, optic neuropathies and corneal graft rejection.[7,17] The most common ocular inflammatory event was anterior uveitis, with more than 50% of patients having a known history of uveitis. Of note, most of the adverse events that occurred were not severe and had good prognosis, with majority of patients managed with topical steroids or observation only (70%) with visual acuity not affected (92.9%).[7] This finding was reiterated by another study which included a literature review, where majority (73%) of visual acuity improved to 20/20. Similarly, systemic corticosteroids were administered in these studies where initial visual acuity was affected.[17]

It is impossible to determine a causal relationship between COVID-19 vaccines and MEWDS. As vast numbers of vaccine doses were administered during the pandemic, it is likely for rare events to occur post vaccination. However, in absence of an alternative explanation, this may suggest a temporal relationship.[19]

CONCLUSION:

In contrast to published literature, where the majority of MEWDS cases occurred following the first two initial doses of SARS-CoV-2 vaccination, both our post vaccination patients developed MEWDS following the booster dose. This suggests that ocular inflammatory events can still manifest with booster vaccination, even in patients who experienced no prior adverse events before.

While ocular inflammatory diseases may occur with vaccination, the risks and benefits must be weighed. Prevention of death, severe COVID-19 disease and hospitalization is the main aim of vaccination. It is estimated that 14.4-19.8 million deaths were prevented from December 2020 to December 2021 from vaccination.[14] Thus far, there is no evidence to impose contraindications of vaccines for immunocompromised patients or those with autoimmune disease.[16] For vast majority of individuals, the benefits of vaccination outweigh the risks of ocular inflammation, therefore clinicians should remain vigilant that ocular inflammatory episodes such as MEWDS can occur, even as a temporal association.[15]

ACKNOWLEDGEMENTS

We would like to thank the Director General of Health Malaysia for his permission to publish this article. We would also like to acknowledge the ophthalmology department and clinical research center of Hospital Selayang for their assistance in producing this manuscript.

This manuscript is registered with the National Medical Research Register of Malaysia with registration number NMRR ID-22-02225-94M. Approval was granted by the National Medical Research Register Secretariat on the 30th September 2022.

Declaration of conflicting interests

The authors declare that there is no conflict of interest.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

REFERENCES:

1. Testi I, Modugno RL, Pavesio C. Multimodal imaging supporting the pathophysiology of white dot syndromes. J Ophthalmic Inflamm Infect 2021; 11(1):32.
2. Tavallali A, Yannuzzi LA. MEWDS, Common Cold of the Retina. J Ophthalmic Vis Res 2017; 12(2): 132-134.
3. Inagawa S, Onda M, Miyase T, et al. Multiple evanescent white dot syndrome following vaccination for COVID-19: A case report. Medicine 2022; 101:2(e28582).
4. Papasavvas I, Mantovani A, Tugal-Tutkun I, Herbort CP. Multiple evanescent white dot syndrome (MEWDS): update on practical appraisal, diagnosis and clinicopathology; a review and an alternative comprehensive perspective. J Ophthalmic Inflamm Infect 2021; 11(1):45.
5. World Health Organization. COVID-19 epidemiological update [Internet]. Geneva: World Health Organization; 2024 July 15 [cited 2026 July 26]. Available from: COVID-19 epidemiological update – 15 July 2024
6. Baharani A, Reddy RR. Multiple Evanescent White Dot Syndrome Following Adenovirus Vector-Based COVID-19 Vaccine (Covishield). Ocul Immunol Inflamm 2023; 31(6):1299–1304.
7. Testi I, Brandão-de-Resende C, Agrawal R, et al. Ocular inflammatory events following COVID-19 vaccination: a multinational case series. J Ophthalmic Inflamm Infect 2022; 12(1):4.
8. Standardization of Uveitis Nomenclature (SUN) Working Group. Classification Criteria For Multiple Evanescent White Dot Syndrome. Am J Ophthalmol. 2021 Aug;228:198-204. doi: 10.1016/j.ajo.2021.03.050. Epub 2021 Apr 15. PMID: 33845025; PMCID: PMC8594763.
9. Invernizzi A, Agarwal A, Jampol LM, et al; Multimodal Imaging in Uveitis (MUV) Task Force. Deconstructing White Dot Syndromes-Multimodal Imaging in Uveitis (MUV) Task Force: Report 11. Am J Ophthalmol. 2026 Sep;289:168-181. doi: 10.1016/j.ajo.2026.05.006. Epub 2026 May 17. PMID: 42150663.
10. Munk MR, et al. Evidence and consensus based imaging guidelines in multiple evanescent white dot syndrome: MUV Task Force Report 6. Am J Ophthalmol. 2025;278:191-202.
11. Gross NE, Yannuzzi LA, Freund KB, et al. Multiple Evanescent White Dot Syndrome. Arch Ophthalmol 2006; 124(4):493-500.
12. Goktas E, Duru N, Goktas A, et al. Multiple Evanescent White Dot Syndrome: A Case Report. Journal of Retina Vitreus 2018; 27(2):191-195.
13. Abu-Yaghi NE, Hartono SP, Hodge DO, et al. White Dot Syndromes: A 20-year study of incidence, clinical features, and outcomes. Ocul Immunol Inflamm 2011; 19(6):426–30.
14. Song YY, Kim JT, Chang YS, et al. Increased incidence and diverse manifestations of Multiple Evanescent White Dot Syndrome during the COVID-19 pandemic. Sci Rep 2024; 14(1):12425.
15. Kashyap H, Manoharan A, Mahendradas P, et al. A COVID-19 perspective of multiple evanescent white dot syndrome (MEWDS). Indian J Ophthalmol 2024; 72(5):620–5.
16. Tomishige KS, Novais EA, Finamor LPDS, et al. Multiple evanescent white dot syndrome (MEWDS) following inactivated COVID-19 vaccination (Sinovac-CoronaVac). Arq Bras Oftalmol 2022; 85(2):186-189.
17. Soifer M, Nguyen NV, Leite R, et al. Recurrent Multiple Evanescent White Dot Syndrome (MEWDS) Following First Dose and Booster of the mRNA-1273 COVID-19 Vaccine: Case Report and Review of Literature. Vaccines (Basel) 2022; 10(11):1776.
18. Abu Serhan H, Abu Suilik H, Hassan AK, et al. The characteristics of white dot syndromes following COVID-19 Vaccines: a systematic review. Int Ophthalmol 2024; 44(1):189.
19. Bouhout S, Hébert M, Vadboncoeur J, Aubin MJ. Multiple evanescent white dot syndrome following COVID-19 vaccines. Can J Ophthalmol 2023; 58(3):e122–4.