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Case Report

Novel and Unusual Retinal Findings in Two Patients with Neurofibromatosis Type 1

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Keywords
Neurofibromatosis type 1 · Spontaneous retinal dialysis · Retinal detachment · Rhegmatogenous retinal detachment · Choroidal nevi

Abstract
Neurofibromatosis type 1 (NF1) is a phacomatosis known to be associated with several developmental abnormalities in multiple organ systems including the eyes. NF1 can present with varying ophthalmic manifestations, including Lisch nodules, retinal astrocytic hamartomas, capillary hemangiomas, plexiform neurofibromas, and choroidal nodules. We present 2 cases of NF1 with presentations that may represent underreported retinal abnormalities occurring in NF1. Case 1 presents a patient who developed spontaneous peripheral retinal dialysis with subsequent retinal detachment; case 2 discusses a patient with multiple pigmented choroidal lesions bilaterally.

Introduction

Neurofibromatosis type 1 (NF1) is an autosomal dominant neurocutaneous disorder with variable expressivity involving multiple systems and affects approximately 1 in 3,000 births [1]. Ophthalmic manifestations of NF1 include Lisch nodules, plexiform neurofibromas, optic pathway gliomas, retinal astrocytic hamartomas, and choroidal nodules [1–3].

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Retinal dialysis is a circumferential retinal tear located along its attachment at the ora serrata which can lead to retinal detachment [4]. Retinal dialyses most commonly occur in young patients following trauma; however, there are also hereditary sources which can lead to spontaneous retinal dialysis [5]. Choroidal nevi are benign melanocytic tumors with a prevalence of approximately 5% in the United States [6]. We present 2 patients with NF1 with novel and unusual retinal findings. Case 1 discusses a patient with NF1 who developed a retinal detachment secondary to spontaneous peripheral retinal dialysis. Case 2 describes a patient with NF1 who presented with presumed multiple choroidal nevi in both eyes. These findings are likely underrecognized manifestations of NF1.

Case 1

A 39-year-old Caucasian female with a history of NF1 was referred to ophthalmology due to a 2-month history of visual field loss following an absence seizure. There was no evidence or history of head or ocular trauma associated with the seizure. The patient did not experience any tonic-clonic activity during the episode. At presentation, physical exam was notable for numerous cutaneous neurofibromas and café au lait macules (Fig. 1a, b). Best corrected visual acuity was 20/20 OU (with −6.25 +0.50 × 094 OD and −6.25 +0.25 × 099 OS). Visual field examination was significant for a temporal defect in the left eye. Pupils, intraocular pressure, and anterior segment examinations were normal except for small Lisch nodules in both eyes (Fig. 1c, d). Fundus examination was normal in the right eye. In the left eye, a retinal detachment extending from the 8 o'clock meridian to the 10 o'clock meridian was noted, with an area of retinal dialysis in the superonasal quadrant and the inferotemporal quadrant. Optic disc examination was normal OU. There was no posterior vitreous separation in either eye (Fig. 2a, b). Fundus autofluorescence was normal in the right eye but showed increased autofluorescence in the superonasal quadrant of the left eye corresponding to the area of detachment (Fig. 2c, d). She was diagnosed with a macula-on rhegmatogenous retinal detachment secondary to spontaneous retinal dialysis. Treatment with scleral buckle and pars plana vitrectomy were discussed, but the patient elected to monitor for progression with close follow-up; unfortunately, the patient was lost to follow-up.

Case 2

A 39-year-old Caucasian female with a history of NF1 was referred to ophthalmology by her optometrist for evaluation of choroidal nevi OU. She had previously been followed by an outside ophthalmologist who had monitored her choroidal nevi for 5 years and reported no changes. On examination, visual acuity was 20/20 OU. Examination of visual fields, pupils, and intraocular pressures were normal. Anterior segment examination was notable only for Lisch nodules OU. Fundus examination was significant for multiple flat pigmented choroidal lesions in the macula and periphery of both eyes (Fig. 3a, b). Optic disc examination was normal OU. Bilateral optical coherence tomography was notable for hyporeflective spaces corresponding with the macular lesions in the right eye (Fig. 3c, d). The patient was scheduled to follow-up in 6 months to monitor for progression.

Discussion/Conclusion

NF1 is a phacomatosis known to be associated with several developmental abnormalities in multiple organ systems [1]. Common ocular findings in NF1 include Lisch nodules, plexiform neurofibromas, optic pathway gliomas, retinal astrocytic hamartomas, and choroidal nodules [1–3]. The findings in these 2 patients may represent underreported abnormalities possibly occurring in NF1.

The vast majority of retinal dialyses and subsequent retinal detachments are associated with a history of significant blunt trauma to the affected eye, such as sporting injuries, assault, and motor vehicle injuries [5, 7]. Traumatic retinal dialyses characteristically affect the superonasal quadrant [8]. Retinal dialyses can also occur spontaneously without any inciting trauma, with such cases often being bilateral and involving the inferotemporal quadrant [5, 8]. Previous studies have suggested that peripheral cystoid degeneration, retinal macrocysts, and retinoschisis were causative factors in the development of spontaneous retinal dialysis [8]. There have been 2 previously reported cases in the literature of retinal detachment with retinal dialysis in patients with NF1 with no other underlying explanations, indicating a possible true association between NF1 and retinal dialysis [9, 10]. Another possible explanation for the increased frequency of retinal dialysis in NF1 may be peripheral ischemia, as multiple case reports in the literature describe retinal vascular occlusion and peripheral retinal ischemia in patients with NF1 [11–17].

A choroidal nevus is a benign melanocytic tumor primarily found in white patients with a prevalence of approximately 5% in the United States and a less than 1% risk for malignant transformation [6]. Although NF1 has widely been associated with various types of cutaneous nevi, choroidal nevi have not been previously associated with this syndrome in the literature [18]. Known retinal manifestations of NF1 include retinal astrocytic hamartoma, combined hamartoma of the retina and retinal pigment epithelium, capillary hemangiomas, and choroidal nodules [3, 19]. Choroidal involvement is very common in NF1. Nodules have a predilection for the posterior pole and increase with age [3]. Though often unremarkable on fundus exam, lesions are easily visible on indocyanine green angiography, though scanning laser ophthalmoscopy and near infrared imaging can also reveal choroidal nodules [3, 20]. Yasunari et al. [3] examined 33 eyes of NF1 patients by noninvasive infrared monochromatic light with confocal scanning laser ophthalmoscopy and found evidence indicative of choroidal involvement in all 33 eyes, suggesting that the choroid is one of the most commonly affected structures in NF1. The unusually high number of presumed choroidal nevi in both eyes of this patient with NF1 suggests that there may be an association of choroidal nevi with NF1 or, perhaps more likely, that NF choroidal nodules collect pigment with time.

In conclusion, NF1 may have associations with ocular abnormalities discussed in these cases beyond those previously described in the literature.

Statement of Ethics

The subjects have each given their informed consent and the study protocol conforms to the institute's IRB requirements.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

D.A.K., R.S., and S.U. contributed to the design, acquisition of data, research, drafting, and revision of the manuscript. All authors reviewed and approved the final manuscript for publication.

References

1 Karaconji T, Whist E, Jamieson RV, Flaherty MP, Grigg JR. Neurofibromatosis Type 1: Review and Update on Emerging Therapies. Asia Pac J Ophthalmol (Phila). 2019 Jan-Feb;8(1):62–72.
2 Ruggieri M, Pavone P, Polizzi A, Di Pietro M, Scuderi A, Gabriele A, et al. Ophthalmological manifestations in segmental neurofibromatosis type 1. Br J Ophthalmol. 2004 Nov;88(11):1429–33.
3 Yasunari T, Shiraki K, Hattori H, Miki T. Frequency of choroidal abnormalities in neurofibromatosis type 1. Lancet. 2000 Sep;356(9234):988–92.
4 Hagler WS. Retinal dialysis: a statistical and genetic study to determine pathogenic factors. Trans Am Ophthalmol Soc. 1980;78:686–733.
5 Hollander DA, Irvine AR, Poothullil AM, Bhisitkul RB. Distinguishing features of nontraumatic and traumatic retinal dialyses. Retina. 2004 Oct;24(5):669–75.
6 Chien JL, Sioufi K, Surakiatchanukul T, Shields JA, Shields CL. Choroidal nevus: a review of prevalence, features, genetics, risks, and outcomes. Curr Opin Ophthalmol. 2017 May;28(3):228–37.
7 Kennedy CJ, Parker CE, McAllister IL. Retinal detachment caused by retinal dialysis. Aust N Z J Ophthalmol. 1997Feb;25(1):25–30.
8 Kinyoun JL, Knobloch WH. Idiopathic retinal dialysis. Retina. 1984;4(1):9–14.
9 Tatsyana I, Irina A, Volha Y, Abelsky D, Dvalishvili A. Unusual and rare ocular findings of neurofibromatosis 1: a case study. EC Ophthalmology. 2019;10(4):290–7.
10 Clemente-Tomas R, Ruíz-Del Río N, Gargallo-Benedicto A, García-Ibor F, Hervas-Hernándis JM, Duch-Samper AM. Retinal detachment with spontaneous dialysis of the ora serrata in a 13-year-old child with neurofibromatosis type 1: A case report. Indian J Ophthalmol. 2020 Jul;68(7):1473–5.
11 Seth A, Ghosh B, Gupta A, Goel N. Peripheral retinal ischemia in a young Indian woman with neurofibromatosis type 1. Saudi J Ophthalmol. 2016 Jan-Mar;30(1):60–3.
12 Moadel K, Yannuzzi LA, Ho AC, Ursekar A. Retinal vascular occlusive disease in a child with neurofibromatosis. Arch Ophthalmol. 1994 Aug;112(8):1021–3.
13 Thölen AM, Messmer EP, Landau K. Peripheral retinal vascular occlusive disorder in a young patient with neurofibromatosis 1. Retina. 1998;18(2):184–6.
14 Kadoi C, Nagaki Y, Hayasaka S. Unilateral peripheral retinal vascular occlusion in a young Japanese woman with neurofibromatosis-1. Retina. 2003 Aug;23(4):541–3.
15 Lecleire-Collet A, Cohen SY, Vignal C, Gaudric A, Quentel G. Retinal ischaemia in type 1 neurofibromatosis. Br J Ophthalmol. 2006 Jan;90(1):117.
16 Elgi U, Berker N, Teke MY, Simsek T, Ozdal P. Unusual association of peripheral retinal ischemia-induced neovascular glaucoma and neurofibromatosis type 1. J Pediatr Ophthalmol Strabismus. 2010 May;47 Online:e1–e3.
17 Pichi F, Morara M, Lembo A, Ciardella AP, Meduri A, Nucci P. Neovascular glaucoma induced by peripheral retinal ischemia in neurofibromatosis type 1: management and imaging features. Case Rep Ophthalmol. 2013;4(1):69–73.

18 Vaassen P, Rosenbaum T. Nevus Anemicus As an Additional Diagnostic Marker of Neurofibromatosis Type 1 in Childhood. Neuropediatrics. 2016 Jun;47(3):190–3.
19 Destro M, D'Amico DJ, Gragoudas ES, Brockhurst RJ, Pinnolis MK, Albert DM, et al. Retinal manifestations of neurofibromatosis. Diagnosis and management. Arch Ophthalmol. 1991 May;109(5):662–6.
20 Vagge A, Camicione P, Capris C, Sburlati C, Panarello S, Calevo MG, et al. Choroidal abnormalities in neurofibromatosis type 1 detected by near-infrared reflectance imaging in paediatric population. Acta Ophthalmol. 2015 Dec;93(8):e667–71.

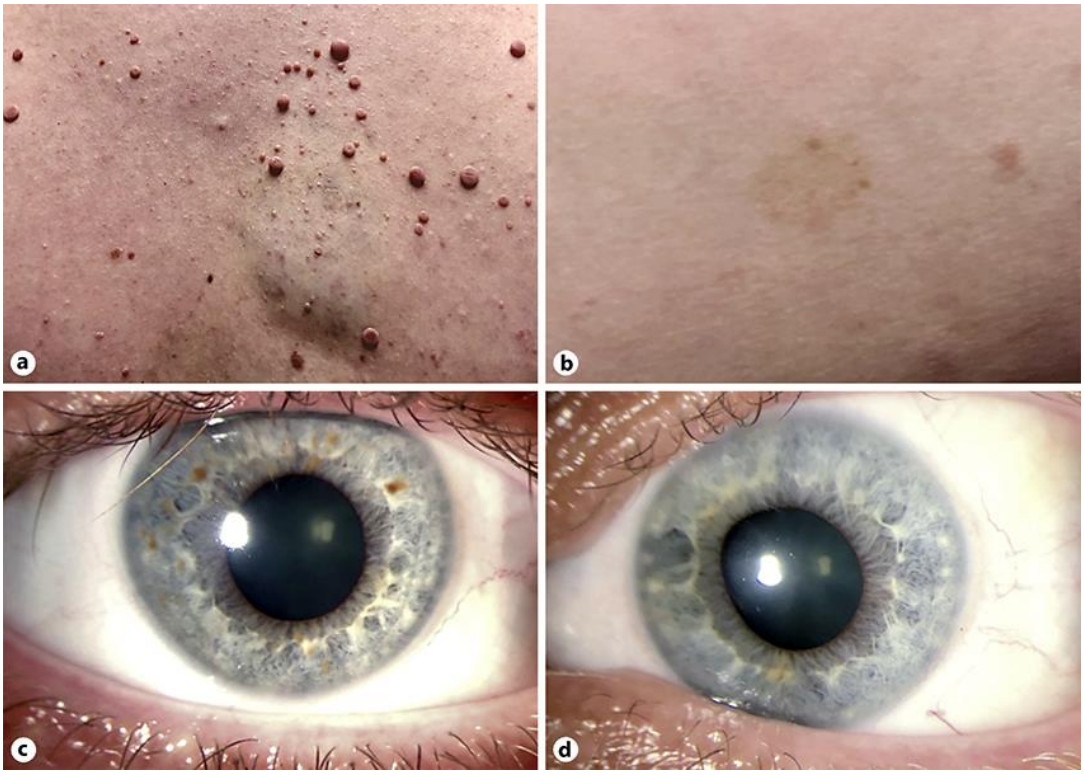

Fig. 1. Case 1. **a** Photograph of the patient's upper back with numerous neurofibromas. **b** Photograph of the patient's right arm demonstrating a café au lait macule. **c** Anterior segment photograph of the right eye demonstrating a Lisch nodule superonasally. **d** Normal anterior segment photograph of the left eye.

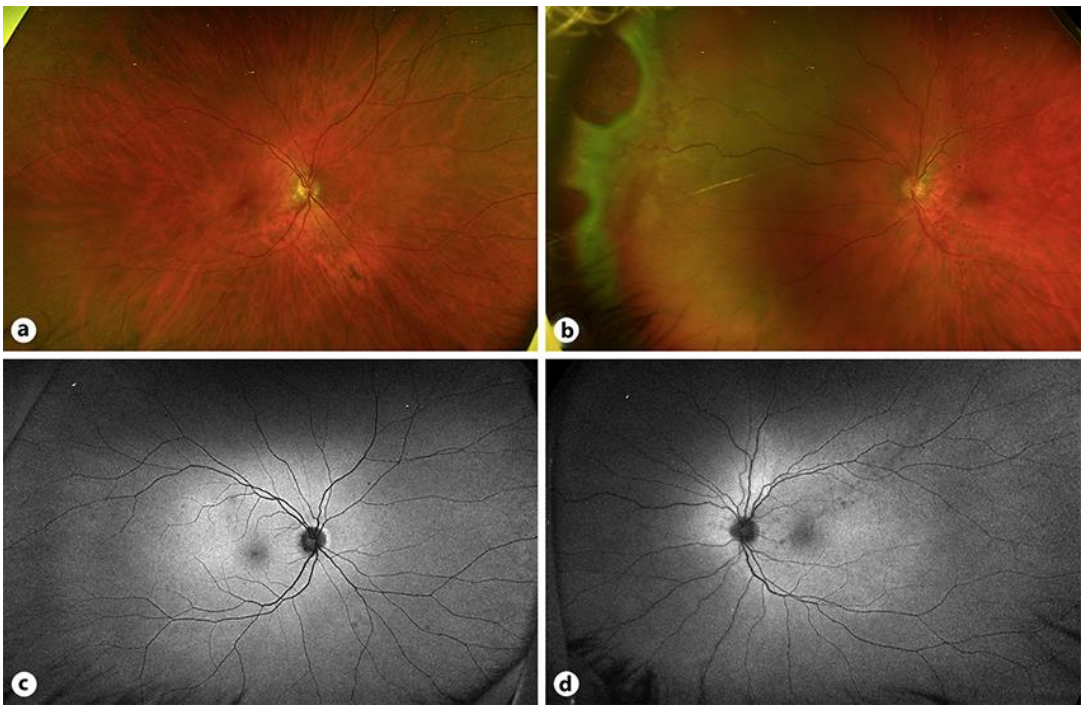

Fig. 2. Case 1. **a** Normal color fundus photograph of the right eye. **b** Color fundus photograph of the left eye demonstrating a retinal detachment extending from the 8 o'clock meridian to the 10 o'clock meridian with an area of retinal dialysis in the superonasal quadrant and the inferotemporal quadrant. **c** Normal FAF of the right eye. **d** FAF of the left eye showing increased fundus autofluorescence in the superonasal quadrant corresponding with the area of detachment. FAF, fundus autofluorescence.

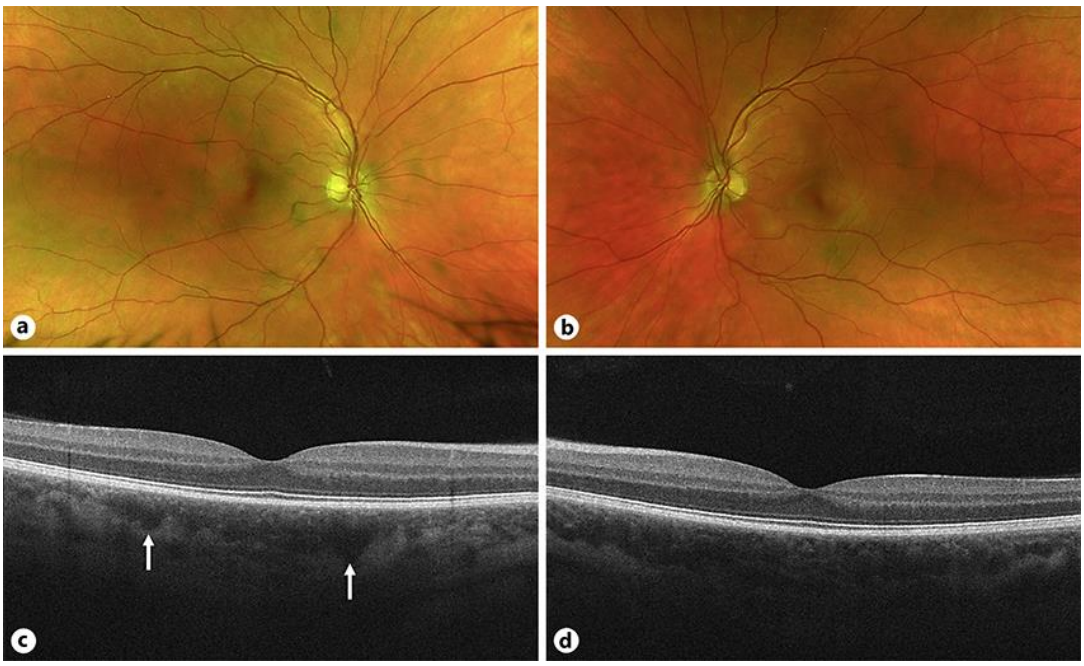

Fig. 3. Case 2. **a**, **b** Color fundus photographs of the right and left eyes revealing multiple, flat choroidal nevi of the macula and periphery. **c** OCT of the right eye revealing macular lesions as hyporeflective spaces (white arrows). **d** Normal OCT of the left eye. OCT, optical coherence tomography.