Saturday night retinopathy and anterograde amnesia due to fentanyl overdose

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Similar to Saturday night palsy, Saturday night retinopathy (SNR) is a condition in which an intoxicated patient falls asleep in an unusual position leading to injury. Direct compression of the orbit leads to increased intraocular pressure, optic nerve edema, and intraorbital arterial and venous vessel compression with vision loss due to ischemia.¹ Bilateral hippocampal ischemia leading to anterograde amnesic syndrome is a new phenomenon that has been described in the setting of multiple drugs of abuse. Our patient developed SNR and anterograde amnesic syndrome after using intranasal fentanyl.

Case report

A 36-year-old man with a history of substance abuse for intranasal heroin, presented with right eye (OD) ptosis, complete ophthalmoplegia, amaurosis, and confusion. He reported intranasal heroin use a few days before his presentation but denied trauma, fever, chills, weight loss, or intravenous drug use.

On examination, the patient was afebrile with normal vital signs, he had no light perception OD, 20/20 vision left eye, an afferent pupillary defect, global restriction of extraocular movements, and periorbital swelling with chemosis. Fundoscopic examination showed diffuse pallor OD without disc swelling, cherry red spot, or choroidal flush. He was oriented to place but not date, and his speech was fluent without any paraphasic errors. Calculations were intact but delayed recall was 0/3 at 5 minutes. During the examination, he repeatedly asked “am I going to die?” During reevaluation 4 hours later, the patient did not recognize any of the neurologists on the team. He was not able to remember a simple story, phrase, or series of words beyond 30 seconds.

He had a leukocytosis of 11.78 K/ μ L and aspartate aminotransferase was elevated at 57 U/L. The rest of his complete blood count, coagulation studies, comprehensive metabolic profile, and blood cultures were normal. CSF analysis showed 1 white blood cell, protein of 42 mg/dL, and glucose of 77 mg/dL. Toxicology screen was positive for fentanyl.

CT orbits were notable for preseptal soft-tissue swelling without extension into the orbit with no associated orbital fat stranding. MRI showed diffusion-weighted imaging restriction along the length of the right optic nerve with increased T2/fluid-attenuated inversion recovery signal, enlarged right extraocular muscles, and extensive soft-tissue swelling along the right frontal, preseptal, and premaxillary soft tissues. Extensive bilateral symmetric diffusion restriction and swelling with apparent diffusion coefficient correlate was noted in the hippocampal gyri (figure 1). Magnetic resonance angiography demonstrated normal flow within the ophthalmic arteries and magnetic resonance venography did not show any venous sinus thrombosis. Fluorescein angiography showed early minimal filling, with rapid washout and diffuse choroidal nonperfusion (figure 2).

PRACTICAL IMPLICATIONS

Early identification of Saturday night retinopathy and anterograde amnesic syndrome secondary to the opioid epidemic can prevent unnecessary treatments including antibiotics, anticoagulation, and antithrombotic therapy.

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Figure 1 Brain MRI

DWI restriction of right optic nerve (A), gadolinium enhancement of right optic nerve and swelling of extraocular muscles (B), and bilateral hippocampal DWI restriction (C). DWI = diffusion-weighted imaging.

He was initially started on vancomycin and piperacillin-tazobactam for a presumed diagnosis of orbital cellulitis. However, based on the clinical course, neurologic examination, ophthalmologic examination, and imaging findings, he was given a diagnosis of SNR and associated anterograde amnesia due to fentanyl overdose. Antibiotics were discontinued and supportive treatment with frequent occupational therapy was commenced.

During the following week, his ophthalmoplegia slowly resolved. On follow-up 3 months after presentation, his memory improved to 2/3 delayed recall at 5 minutes and 6/8 paragraph level recall, demonstrating a mild deficit in memory. However, he remained without light perception OD. OD atrophy was present on fundoscopy.

Discussion

SNR was first coined in 1974 in a patient who developed ischemic retinopathy after a Saturday night of drug use and heavy drinking.¹ This phenomenon had also been described in the setting of prolonged surgery under general anesthesia.² Although several case reports have described SNR after

a combination of alcohol and IV drugs,³ the association of SNR with intoxication by intranasal fentanyl is rare.

SNR with conjunctival injection, proptosis, ophthalmoplegia, and pupillary involvement can mimic other infectious, inflammatory, and vascular conditions. Our diagnostic findings made orbital cellulitis, central retinal artery occlusion, carotid-cavernous fistula, and cavernous sinus thrombosis unlikely, given the lack of fat stranding, thrombus, or aneurysm seen. Given the severity of his symptoms, the direct orbit compression most likely led to prolonged ophthalmic artery occlusion, which ultimately led to orbital ischemia and the findings seen on fluorescein angiogram. In other reported cases, reduced choroidal perfusion indicated involvement of the ophthalmic artery as well as the central retinal artery.³ In our patient, magnetic resonance angiography showed normal flow within the ophthalmic arteries.

The patient's brain MRI revealed bilateral hippocampal ischemia, associated with the anterograde amnesic syndrome reported in association with opioid abuse.⁴ The mechanism for the hippocampal restricted diffusion is most likely hypoxemia.⁵ The hippocampus relies preferentially on oxidative

Figure 2 Fluorescein angiography OD and OS

Fluorescein angiogram OD shows decreased choroidal, arterial, and laminar venous filling. There is patchy hypo- and hyper-fluorescence of the choroid throughout. Fluorescein angiogram OS shows normal choroidal, arterial, and laminar venous filling. OD images are hazier due to periorbital and orbital edema. OD = right eye; OS = left eye.

phosphorylation with less aerobic glycolysis, predisposing it to injury from hypoxemia in patients with low respiratory drive.⁶ In these drug-related cases of anterograde amnesia, cocaine, opioids, synthetic opioids, and alcohol have all been reported, which makes it less likely that the hippocampal injury is due to direct drug toxin effect from fentanyl.⁵

Identifying amnesia due to bilateral hippocampal ischemia was important in our case to help combine the association of the drug use and its clinical consequences. Early occupational therapy, cognitive therapy, and addiction counseling was important for our patient's safety and long-term prognosis.

More than 100 million adults in the United States live with chronic pain, and despite increased awareness of opioid abuse, addiction rates have continued to increase.⁷ One hundred fifteen people die every day of opioid overdose and an estimated 4.5 million people use heroin or abuse prescription pain medications.⁷ As these numbers continue to increase, SNR and anterograde amnesic syndrome will become more common.

Author contributions

J. Budhu has contributed to the conception, writing, critical revision, and final approval of the text and images. I. Tolokh, M. Bouffard, and S.H. Wray have contributed to writing, critical revision, and final approval of the text and images.

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