

PTOSIS, CONVERGENCE DISORDER AND HEROIN

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Drug abuse is a widespread phenomenon which affects all levels of society. General practitioners and primary care physicians are regularly being called upon to see drug users in everyday clinical practice, and are increasingly expected to identify, treat and monitor drug abuse problems. The eye is closely connected to the central nervous system. It responds immediately to nervous stimuli including those induced by drugs. Drug effects on the eye are seen within minutes of use well before the drug could be detected in body fluids. Because of this sensitivity, eye examination in suspected individuals could provide useful diagnostic clues to the treating physician.

Many eye complications have been reported in drug users.^{1,2} These include ptosis, abnormal pupil size, non-reactivity of the pupil to light, diplopia, nystagmus, non-convergence and increased lacrymation. All the major abused drugs including cocaine, marijuana, amphetamine, phencyclidine, heroin, and alcohol produce eye signs. The exact incidence and prevalence is not known. There have been no recent reports of drug-induced eye disorders. A case of unilateral ptosis with inability to converge both eyes on a near object is being reported in an IV drug user. He was admitted to Al Amal Hospital in Jeddah, Saudi Arabia, for management of heroin withdrawals in October 1998. The hospital specializes in the treatment of drug addiction.

Case Report

A 29-year-old IV heroin-dependent Saudi male was admitted for treatment of mild withdrawals. He complained of recurrent left eye ptosis that first appeared a few months earlier when he increased his daily consumption of heroin to around the 10 g he was taking on presentation. Ptosis normally emerged within minutes after injecting and resolved spontaneously in 1-2 days. Since the increase, he had also experienced eyestrain and discomfort on reading. This was mostly associated with increased congestion and

excessive lacrymation in the affected eye. He did not attribute any of these symptoms to withdrawals. There was no history of medical illnesses or operations. Family history was significant for hypertension and diabetes. The patient also gave a history of previous involvement in road traffic accidents, but denied ever sustaining any trauma or injuries. This was his third admission. On the two previous admissions, he had no eye signs or symptoms. He was then using relatively smaller amounts of heroin of 4-5 g/day.

On presentation the patient was alert and oriented. Mental status examination and cognitive functions were normal. The left eye was almost completely closed due to the ptosis. He denied any diplopia. Pupils appeared normal in size but reacted sluggishly to light. Extraocular movements were full and there was no nystagmus. Fundi were normal. He was unable to converge both eyes on a near object. The rest of the physical examination including neurological was unremarkable. Vital signs were within normal limits but investigations revealed a positive hepatitis C serology and ESR of 22. Drug screening was positive for barbiturate that is a common ingredient of local heroin powder. Brain neuroimaging studies could not be arranged. By the following morning, the ptosis had completely cleared and the eye convergence had returned to normal. Ophthalmology consultation was not sought as the symptoms resolved quickly and completely.

Discussion

The ptosis and inability to converge the eyes which were being experienced by our patient were clearly related to the use of heroin. These recurrent symptoms appeared when the amount of the injected drug was increased. Ptosis is commonly seen with third-nerve palsies, Horner's syndrome, myasthenia gravis, muscular dystrophies and toxic myopathies.^{3,4} Unilateral ptosis can also occasionally result from both ipsilateral and contralateral hemispheric lesions. This patient had more or less complete ptosis with normal extraocular movements and pupil size. Third-nerve palsy or Horner's syndrome was therefore unlikely. Although he had few clinical features suggesting sympathetic loss-like conjunctival congestion and excessive lacrimation, these alone did not explain the entire clinical picture. The patient reported previous involvement in road

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traffic accidents, but cranial nerve palsy associated with mild head injury is rare. The rate of recovery for traumatic nerve palsies is usually slow and prolonged.

A wide variety of drugs and chemicals including heroin damage the muscle.⁵ Toxic myopathy normally produces very few symptoms. These usually recover on cessation of the offending agent. Toxic myopathy of LPS (levator palpebralis superioris) muscle induced by heroin is therefore a possibility. However, the clinical recovery would not be this rapid.

Ocular myasthenia had been reported in IV drug users,^{6,7} but is unlikely due to the absence of symptoms of fatigability and diplopia. Dystrophies involve muscles bilaterally, do not affect the pupil, and invariably affect the face and limb girdles.

Ptosis is a known heroin withdrawal symptom in both animals and humans. In our patient, the onset of ptosis was within minutes of injection, suggesting heroin intoxication rather than withdrawal. It resolved very quickly well before the disappearance of other withdrawal symptoms. Heroin withdrawal is therefore an unlikely explanation.

Convergence disorder is seen in degenerative conditions like Parkinson's disease or disorders of the cerebral hemispheres, midbrain and cerebellum.⁸ Eye discomfort or eyestrain reported by the subject was most probably due to convergence disorder, implying that this symptom-like ptosis was also recurrent. Given that ptosis and convergence disorder occurred together, it would be correct to infer that both symptoms were due to the same etiology. As these symptoms were completely reversible structural damage to the nervous system was therefore very unlikely. Because of its temporal relationship to IV injection, both symptoms were most probably caused by heroin. Street heroin has many adulterants,¹ and it is possible that some unknown adulterant or a known adulterant with unidentified harmful effects may be responsible for the clinical picture.

Heroin is known to cause several neurological and muscular complications.⁹⁻¹³ These include non-traumatic and compression neuropathies, plexopathies, inflammatory demyelinating polyradiculopathies, myelopathy, spongiform leukoencephalopathy, borderzone infarctions, cerebral vasculitis, cerebral and spinal cord vasospasm, cerebral and spinal cord hypoperfusion, infections, toxic myopathy and rhabdomyolysis. Heroin may harm the nervous system in various ways. It may be directly neurotoxic. The anti-heroin antibodies may cross-react with nervous tissue antigens. Vasculopathy mediated by the immune complexes may lead to neurological damage. Hypoperfusion induced by heroin may cause ischemic injury or infarction.

It is difficult to explain the symptoms in our patient on the basis of a single factor. There are two likely explanations. First, these symptoms might be due to brain ischemia. The region of the mid-brain where motor neurons for LPS and eye convergence muscles originate could have

suffered reversible ischemic damage. The mid-brain receives blood supply from three different sources. The convergence center lies just lateral to the third-nerve nucleus in the pretectal mid-brain. Because of close anatomical proximity of these structures, both could have been damaged by the same vascular pathology. Hypotension, vasculitis or vasospasm associated with heroin intake could have resulted in hypoperfusion or ischemia of the watershed areas of the mid-brain affecting both the motor neurons of the LPS and the convergence center. Alternatively, hemispheric hypoperfusion or ischemia might have resulted in ptosis and convergence disorder. The mechanism of ptosis of hemispheric origin is poorly understood. The convergence disorder might have been due to the involvement of occipito-mesencephalic pathways. The recurrent nature of these symptoms, time course and spontaneous recovery are consistent with the ischemic hypothesis. However, absence of other neurological signs or symptoms goes against this assumption.

The second explanation is selective neuronal toxicity. Chronic heroin use induces long-lasting changes in the neurotransmitter and receptor systems that may alter neuronal functioning.¹⁴ It is possible that heroin, especially in high doses, may be toxic to neurons innervating LPS muscle and eye convergence muscles. Perhaps these neurons, due to yet unrecognized common property, may be more vulnerable to this toxic effect.

Our case demonstrates that besides altering the mind, intravenous heroin use has significant effects on the eye. Any unexplained eye finding, especially in a young individual should make the physician think of possible drug abuse. Eyes should therefore be properly examined in all suspected cases. Eye examination is relatively simple, quick and easy. It could provide useful diagnostic clues to the treating physician.

References

1. Webb RM, Schneider DM. Ophthalmology. In: Miller NS, editor. Section 7, Chapter 7. Principles of Addiction Medicine. ASAM Inc., 1994.
2. McLane NJ, Carroll DM. Ocular manifestations of drug abuse. *Surv Ophthalmol* 1986;30:298-313.
3. Victor M, Adams RD, Collins GH. Principles of Clinical Myology. In: Principles of Neurology. Singapore: McGraw Hill International Editions, 1989:1090-103.
4. Romano A, Kurchin A, Rudich R, Adar R. Ocular manifestations after upper dorsal sympathectomy. *Ann Ophthalmol* 1979;11:1083-6.
5. Fernandez-Sola J, Pedrol E, Masanes F, Casademont J, Grau JM, Urbano-Marquez A. Toxic myopathies: clinical, etiologic, and histologic study of 74 cases. *Med Clin (Barc)* 1993;15:100:721-4.
6. Valmaggia C, Gottlob IM. Cocaine abuse, generalized myasthenia, complete external ophthalmoplegia, and pseudotonic pupil. *Strabismus* 2001;9:9-12.
7. Wild P, Ammann P, Galeazzi RL. Drug addict with ptosis: myasthenia gravis. *Schweiz Rundsch Med Prax* 1999;6:88:871-5.
8. Patrick JM, Weissman L, Weissman B. Neuro-ophthalmology. In: Bradley WG, Daroff RP, Fenichel GM, Marsden CD, editors.

- Neurology in Clinical Practice. MA: Butterworth-Heinemann, Newton, 1996.
9. Niehaus L, Meyer BU. Bilateral borderzone brain infarctions in association with heroin abuse. *J Neurol Sci* 1998;160:180-2.
 10. Rizzuto N, Morbin M, Ferrari S, Cavallaro T, Sparaco M, Boso G, Gaetti L. Delayed spongiform leukoencephalopathy after heroin abuse. *Acta Neuropathol (Berl)* 1997;94:87-90.
 11. Bernasconi A, Kuntzer T, Ladbon N, Janzer RC, Yersin B, Regli F. Peripheral nerve and spinal cord complication in intravenous heroin addiction. *Rev Neurol (Paris)* 1996;152:688-94.
 12. Loizou LA, Boddie HG. Polyradiculoneuropathy associated with heroin abuse. *J Neurol Neurosurg Psychiatry* 1978;41:855-7.
 13. Di Benedetto M. Electrodiagnostic evidence of subclinical disease states in drug abusers. *Arch Phys Med Rehabil* 1976;57:62-6.
 14. Hammer RP. *The Neurobiology of Opiates*. Boca Raton, Florida: CRC Press Inc.,1993.