

# Sixth Cranial Nerve Palsy in Diabetes

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**Abstract:** *Diabetes mellitus is a rare but benign cause of Cranial neuropathy. Extra ocular motility disorders may occur in patients with diabetes, secondary to diabetic neuropathy, involving the third, fourth, or sixth cranial nerve. Third cranial nerve is most commonly affected due to diabetes induced micro-vasculopathy. Rarely, sixth cranial nerve palsy can occur. We report a 48-year-old man, a known case of diabetes mellitus for 10 years, who presented with binocular diplopia, secondary to sixth nerve palsy. Neuropathy of the cranial nerves, despite being a rare entity in diabetes mellitus, appears to be a serious problem from a diagnostic and therapeutic point of view. Although the prognosis is excellent, it remains a diagnosis of exclusion and retrospection.*

**Keywords:** Diabetes, Cranial Nerves, Neuropathy, Micro-vasculopathy, Diplopia

## 1. Case Report

A 48-year-old man presented to our hospital with complaint of double vision and headache of one week duration. He is diabetic from 10 years. At presentation his blood sugars are

uncontrolled. Neuro-ophthalmologic examination was normal except for unilateral impairment of abduction on the left (Fig. 1)



There was no history of neurologic or cardiac disease, hypertension, cigarette smoking, or alcohol consumption. He had been taking oral hypoglycemic agents for approximately 10 years. Laboratory examinations included a normal blood count, erythrocyte sedimentation rate, renal and liver function tests, thyroid function tests, and cerebrospinal fluid formula, including cytocentrifuge examination for neoplastic cells. There was an elevated fasting plasma glucose level of 145 mg/dl (normal, 70-130 mg/dl) and HbA1C of 10.1 (normal < 6.5%). A pyridostigmine test for myasthenia gravis was negative. Repetitive nerve stimulation test of the trapezius and orbicularis oculi muscles was normal. Skull x-

rays and MRI/Magnetic resonance angiography including the neck and head were normal.

Given the normal examinations, we tentatively attributed the ocular motor findings to diabetes mellitus. The patient was prescribed oral Hypoglycemic agents, Statin, a controlled diet, and methylcobalamin injections. An occluder was prescribed for his left eye to prevent diplopia and he is advised to do extraocular muscle exercises. 8 weeks later, his fasting glucose level is 98 mg/dl the ocular motor findings had disappeared (Fig. 2).



## 2. Discussion

Oculomotor cranial nerve palsies are common in diabetes, but our case represents an uncommon event in diabetes: isolated unocular sixth nerve palsy. In 1976, Keane analyzed 125 cases of bilateral sixth cranial nerve palsies; none was classified as diabetic. In 1981, Rush and Younge analyzed 1,000 patients with ocular motor cranial nerve palsies and found bilateral involvement of the sixth cranial nerve in 33. None was caused by vascular disorders. In more than half of the cases, the bilateral sixth cranial nerve involvement was associated with head trauma, pontine neoplasm, or aneurysm of the posterior circulation. In that series, 8 patients had bilateral third cranial nerve palsies, 2 of which remained idiopathic. Thirteen patients had bilateral fourth nerve palsies, none from diabetes. In another large study of patients with ocular motor cranial nerve palsies (3), there were 53 cases of bilateral sixth nerve palsies; none was attributed to diabetes. Nine patients had bilateral third nerve palsies, 3 of undetermined cause and none from diabetes. Of the 21 bilateral fourth nerve palsies, none was attributed to diabetes. Considering both studies together (3), there were 15 (1.5%) cases with multiple cranial nerve palsies that were attributed to a vascular cause, 3 of them (0.3%) with diabetes. Two of these diabetic cases had asymmetric third and fourth cranial nerve palsies; the other was not further described. Sergott et al (4) reported two cases of bilateral third and fourth cranial nerve palsies associated with diabetes. In both cases, the ophthalmoplegia resolved completely within a few months. Jay and Nazarian (5) described a patient with bilateral sixth nerve palsy associated with temporal arteritis and diabetes. The cranial neuropathy was attributed to diabetes.

In a 2003 study of 2,229 patients with ocular motor palsy, Trigler et al (6) reported 8 (0.1%) cases with multiple simultaneous palsies attributable to diabetes; 5 were unilateral and 3 were bilateral. The unilateral cases involved third and sixth cranial nerves in all but one case, which had combined third and fourth cranial nerve palsies. The bilateral cases consisted of a right third and left sixth nerve palsy, a right fourth and left sixth nerve palsy, and a right sixth and left fourth cranial nerve palsy. There were no cases of bilateral sixth nerve palsy associated with diabetes. In a study of 137 patients with sixth cranial nerve palsy over a period of 15 years, Patel et al found 4 cases of bilateral sixth nerve palsy but none was associated with diabetes. One of the cases was, however, classified in the undetermined group. The etiology of the other 3 cases was not mentioned. In 2005, Keane (7) analyzed 979 cases with multiple optical motor cranial nerve palsies in which 25 cases were attributed to diabetes mellitus but an undocumented number had other potential causes.

The essence of this review is that multiple simultaneous ocular motor cranial palsies are not safely attributed to diabetes. Most cases will eventually be connected to neoplastic or inflammatory disease of the cranial base meninges. A proper workup with high-definition imaging and spinal fluid examination is indicated. Sixth nerve palsy

attributed to diabetic micro vasculopathy has good prognosis with good control of blood glucose levels.

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