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Commentary: Recognizing Pupillary Dysfunction in Diabetic Autonomic Neuropathy

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Commentary: Recognizing pupillary dysfunction in diabetic autonomic neuropathy

Diabetes affects several million people across this universe. An early consequence of diabetes is autonomic dysfunction,[1] which is often subclinical and the most common cause of an autonomic neuropathy in the developed world. Hyperglycemia causes a synaptic ganglionic transmission failure, thus leading to autonomic impairment.[2]

Autonomic neuropathy can be a serious complication of diabetes mellitus. Unfortunately, it can remain asymptomatic for years. It causes a constellation of symptoms and signs affecting cardiovascular, urogenital, gastrointestinal, pupillomotor, thermoregulatory, and sudomotor systems.

Pupillary abnormalities from autonomic neuropathy are common in diabetes. The deficiency in the sympathetic innervation to the dilator muscles of the iris can cause difficulty in night vision in diabetic patients. Impairment of the parasympathetic control of the sphincter muscles accounts for a diminished reflex response to light. It has been shown that diabetic patients with mild autonomic dysfunction have significantly smaller pupil diameters than healthy controls.[3] This suggests that pupillary involvement may be an early sign of diabetic autonomic neuropathy.[4]

Studies have shown that pupillary abnormalities are worse in patients with diabetic autonomic neuropathy compared to patients with nondiabetic autonomic neuropathy.[5] Preferential ganglionic involvement may explain the higher frequency of pupillary abnormalities in diabetic autonomic neuropathy compared to nondiabetic autonomic neuropathy, independent of the degree of diff use autonomic failure.

Erectile dysfunction is the chronic inability to attain and maintain enough erection. Besides diabetes, there are several causes for erectile dysfunction such as vascular diseases, obesity, smoking, metabolic syndrome, hyperlipidemia, depression, and medication side effects. Erectile dysfunction appears to be common in diabetes, affecting more than half of men with the condition and with a prevalence odd of approximately 3.5 times more than controls.[6]

The authors of the article through a prospective study using static and dynamic pupillometry were able to show that pupillary functions were worse in those with both diabetes and erectile dysfunction compared with healthy controls.[7] Also, they have shown that the pupil was more miotic in those with severe erectile dysfunction than in those with mild or moderate erectile dysfunction. There is an important and sensitive message in this. While previous literature has revealed the relation between diabetes and both erectile dysfunction and pupil functions, none had studied the direct relation between erectile dysfunction severity and pupil functions in diabetes.

Pupillary abnormalities have been noted to precede the development of more serious symptoms such as cardiovascular symptoms. By recognizing the pupillary dysfunction, the ophthalmologist could warn the primary care to look into more serious autonomic dysfunctions such as cardiovascular abnormalities and erectile dysfunction. Some of this could be life-saving. Apparently, it is possible that with longer duration of diabetes and more pupillary miosis, the primary care is likely to see more severe autonomic dysfunction including severe erectile dysfunction. In many circumstances, the patient may not vocalize this issue unless specifically questioned.

There are different tools to study autonomic dysfunction (quantitative sudomotor axon reflex test, heart rate response to deep breathing, tilt-table testing) especially in diabetes. This needs a thorough physical examination. Specific testing is not usually undertaken in the ophthalmology setting. Dynamic pupillometry is a cost-effective screening tool that is noninvasive and relatively easy to perform in the office.[8] It can be used as an effective autonomic testing tool in the ophthalmology setting.

The authors have recognized that structural changes in the pupillary musculature could contribute to abnormal pupil functions in diabetes. Similarly, structural changes in the penis could play a role in erectile dysfunction in diabetes.

Thus, the article has two important messages. The first is the role that ophthalmologist may play in recognizing diabetic autonomic neuropathy early by identifying pupillary abnormalities. Thus, ophthalmologists should specifically look for pupillary abnormalities just like looking for diabetic retinopathy. Abnormal pupillary findings should be communicated with the primary care physician to address sensitive issues such as erectile dysfunction. The recognition of abnormal pupil examination can be life-saving too as it can lead to evaluation for serious cardiovascular issues.

The second message is that static and dynamic pupillometry could serve as an important autonomic testing tool. The examination of pupillomotor function through such techniques may improve diagnostic accuracy in the autonomic laboratory.

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