DIAGNOSTIC CHALLENGE

Answer

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The correct answer is "c" (Horner syndrome due to carotid artery dissection).

Johann Friedrich Horner was a Swiss ophthalmologist who, in 1869, was the first to identify the syndrome of miosis, ptosis and anhydrosis as a result of interruption of the sympathetic nervous supply to the eye and periocular structures.

An understanding of the innervation of the eye is paramount to understanding the pathophsiology of sympathetic denervation (Fig. 1). The nucleus for the sympathetic nervous system resides in the posterior hypothalamus. First order preganglionic fibres travel from there down the spinal cord and synapse at the level of C_8 and T_1 on the ipsilateral side. Second order preganglionic fibres exit the cord with the anterior roots of the upper thoracic nerves. These fibres pass through white matter and terminate in the superior cervical ganglion just opposite the transverse processes of the second and third cervical vertebrae. Postganglionic fibres then travel with the internal carotid artery into the carotid canal to join with the ophthalmic division of the trigeminal nerve on its passage to the orbit. Sympathetic fibres travel in the nasociliary nerve to supply the dilator pupillae and periocular vasculature and in the oculomotor nerve to supply the superior tarsal muscle.

The passage of the sympathetic supply adjacent to the internal carotid artery leaves it vulnerable to compression when there is dissection within the carotid sheath. When looking for signs of Horner syndrome, it is useful to remember the saying that "Horners like dark corners." This phrase refers to the fact that maximum difference in pupil size (anisocoria) is seen when the patient is examined in a darkened room.

Carotid artery dissection occurs as a result of rapid deceleration combined with severe stretching of the artery during sudden hyperextension with lateral flexion, rotation

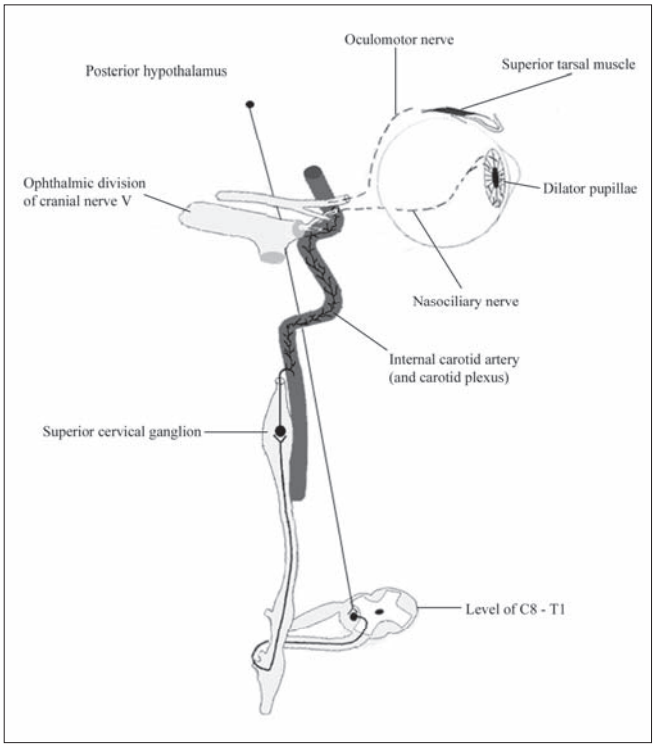

Fig. 1. The sympathetic innervation of the eye. Adapted from Ostergaard C, Faix DJ. Horner syndrome from the dentist's chair. J Am Board Fam Pract 2001;14:386–8.[1]

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of the neck to the opposite side or both.[2,3] Blunt carotid injury, although less common in motor vehicle collisions, does occur and it can also lead to dissection.[4] In addition to ocular sympathectomy, carotid artery dissection can lead to intraluminal thrombosis and stroke.

Although no primary injury was sustained to the eye in this case, careful assessment of Figure 2 reveals a 1-mm ptosis. Assessment of ptosis in this picture can be made easier by assessing the position of the upper lid margin relative to the pupillary border, as both pupils can be seen to be dilated symmetrically.

Magnetic resonance imaging (MRI) revealed narrowing of the distal cervical segment of the right internal carotid artery with evidence of dissection attenuation around the vessel (Fig. 3). In this T_2 scan, white areas represent flowing blood, the low attenuation crescent represents mural thrombus forming in the layers of the internal carotid artery. A T_1-weighted MRI taken simultaneously would show inversion of these shades with a newly formed thrombus appearing as a white crescent around a dark central lumen.

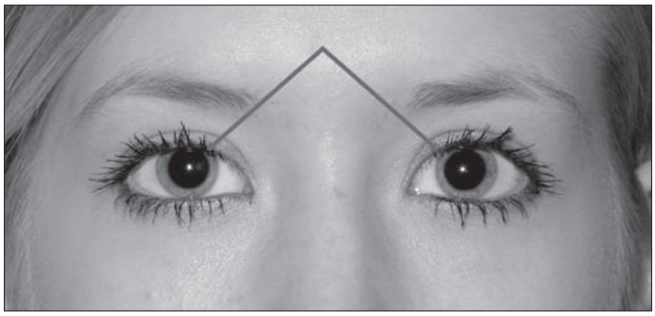

Fig. 2. Right-sided ptosis is evident but the miosis is subtle.

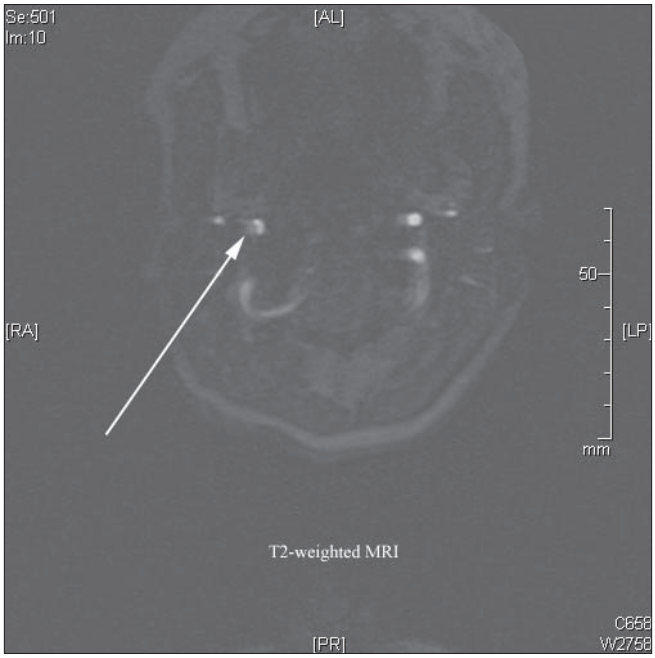

Fig. 3. T_2-weighted magnetic resonance scan at the upper cervical level highlighting carotid artery narrowing and dissection laterally (arrow).

The patient in this case was seated in the back seat behind the driver (which in the UK is the right side of the vehicle) with the seat belt passed over her right shoulder, diagonally across her chest. At the point of collision, force was transmitted through her neck, injuring the internal carotid artery. The diagnosis of Horner syndrome in our patient represents an ocular manifestation of what was primarily a vascular injury caused by blunt trauma to the neck by her seat belt.

Our patient went on to be treated with antiplatelet agents for 3 months as guided by our medical physicians.

Although rare, the subtle signs of Horner syndrome should not be missed and should be assessed in this type of rapid deceleration injury because of the potentially devastating consequences of a cerebrovascular incident.

For the challenge, see page 478.

Competing interests: None declared.

Keywords: automobile collision, ptosis, miotic pupil, carotid artery dissection, Horner syndrome

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