Incomplete oculomotor nerve palsy in the subarachnoid space caused by traumatic brain injury

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ABSTRACT

نستعرض في هذا المقال حالة مريضة مصاب بإصابة رضحية في الدماغ مما أدى إلى شلل العصب الحرك للعين في الحيز تحت المنطقة العنكبوتية. لقد قمنا بتنويم المريضة التي تبلغ من العمر 12 عاماً في المستشفى بعد إصابة الرأس. وأظهر الاختبار التشخيصي وأشارت أشعة الرنين المغناطيسي إلى وجود ورم دموي في الجزء القاعدي للصدغ الأيسر. ولقد تحسن تضرر الحدقة والتدلي بعد إيقاف الورم الدموي، وأفضل طريقة لتفسير المظاهر السريرية للمرض هي بواسطة التوزيع الطبغرافي لألياف العصب الثالث داخل الحيز تحت المنطقة العنكبوتية. وهكذا نستنتج من هذه الحالة أنه يجب أخذ التوزيع الطبغرافي للعصب الثالث بعن الاعتبار أثناء تشخيص شلل العصب المحرك للعين.

A patient with traumatic brain injury showed incomplete oculomotor nerve palsy in the subarachnoid space. A 12-year-old girl was hospitalized after a head injury. Neuro-ophthalmic examination showed that the left eye had a ptosis and pupillary involvement. An MRI indicated an intracranial hematoma at the basilar portion of the left temple. The ptosis and pupillary involvement improved after elimination of the hematoma. The presentation patterns are best explained by topographic organization of the third nerve fiber within the subarachnoid space. This case suggests that the topographic organization of the third nerve should be considered in diagnosis of oculomotor nerve palsy.

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The oculomotor nerve innervates 4 of the 6 L extraocular muscles, the pupillary sphincter muscle, and the levator palpebrae superioris. Oculomotor nerve palsy generally causes ptosis, mydriasis, impairment of eye adduction, and upward and downward gaze palsy. The abnormal oculomotor neurological manifestations depend on the anatomical location of the lesion.^{1,2} Thus, a divisional third nerve palsy may occur from damage at any location along the course of the oculomotor nerve from the fascicle to the orbit, although superior and inferior divisional third nerve palsies have been classically localized to the anterior cavernous sinus or posterior orbital lesions.² Therefore, the topographic organization of the third nerve fiber should be considered in the diagnosis of oculomotor nerve palsy.³ Our objective in reporting this particular case is to improve the localization diagnosis of oculomotor nerve palsy.

Case Report. A 12-year-old girl was admitted to hospital 5 hours after being hit by a crabstick on her left temple. On admission, she was in a coma with mydriasis of the left eye. She recovered consciousness 3 days after an emergency hematoma elimination. However, the neuro-ophthalmic examination showed that the left eye had a ptosis and pupillary involvement. She was transferred to our hospital 12 days after the injury. Neuro-ophthalmic examination showed that she had a slight ptosis and mydriasis on her left eye. Her left pupil was 5 mm in diameter and did not react to light. Her visual acuity was intact. She had no hemiparesis. An MRI of the brain and the skull indicated a contusion and laceration of the brain at the left temple, and an intracranial hematoma at the basilar portion of the left temple (Figures 1a & 1b). Another hematoma elimination was carried out 3 days after her transfer. As

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Figure 1 - Patient T1-weighted MRI showing: **a**) contusion and laceration of the brain at the left temple, and **b**) an intracranial hematoma at the basilar portion of the left temple.

a result, a 40 ml blood clot was cleared. Her left pupil was 4 mm in diameter and had a little reaction to light 2 weeks after the operation.

Discussion. The anatomical location of the lesion in this case was at the basilar portion of the left temple. According to Bhatti et al's division,¹ the location along the course of the oculomotor nerve can be divided into 3 groups including the midbrain, the subarachnoid space, and the cavernous sinus/superior orbital fissure.¹ The location of the intracranial hematoma in this case belongs to the subarachnoid space. In the subarachnoid space, the third cranial nerve palsy tends to occur in isolation without other cranial nerves being involved. Aneurysm is the most common lesion in this anatomical location. Oculomotor nerve palsy in the subarachnoid space is usually completely involved; especially in an aneurysm.⁴ Other diseases such as basal meningeal infection, neoplastic infiltration, and miscellaneous inflammatory lesions are also common lesions in the subarachnoid space. These lesions may involve the third, and all the other cranial nerves.⁵⁻⁷ In the subarachnoid space, the dysfunction features of the oculomotor nerve are complete or incomplete (divisional) paresis and pupil involvement (+ o r-). There was only incomplete ptosis and complete mydriasis in this case.

The abnormal oculomotor neurological manifestations depend on the anatomical location of the lesion.¹ We should therefore consider the topographic organization of the oculomotor nerve fiber. A divisional third nerve palsy may occur from damage at any location along the course of the oculomotor nerve, from the fascicle to the orbit.² The clinical presentation of midbrain oculomotor nerve palsy could only be superior divisional palsy.⁸ It is generally accepted that a normal pupil practically excludes an aneurysm as the cause of the isolated oculomotor nerve palsy.⁹ However, an

aneurysm in the subarachnoid space sometimes shows incomplete oculomotor palsy with pupil sparing.⁶ Due to these unusual presentations, more and more studies have focused on the topographic organization of the oculomotor nerve fiber. There was only incomplete ptosis and complete mydriasis in this case, with a lesion in the subarachnoid space of the oculomotor nerve. This provides further evidence to illustrate the importance of the topographic organization of the oculomotor nerve fiber.

In conclusion, the presentation patterns of the oculomotor nerve palsy depend on the anatomical location of the lesion. However, there may be unusual presentations in some cases. An oculomotor nerve palsy diagnosis should consider the topographic organization of the third nerve fiber.

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