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MRI Results of Patients with Acute Isolyted Cranial Nerve Palsies

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ABSTRACT

AIM: To investigate the magnetic resonance imaging (MRI) results of patients complaining from diplopia with ocular nerve palsy.

MATERIAL and METHODS: A routine ophthalmic examination was performed, a neurological consultation was requested, and cranial MRI was performed for all patients. The image results were sorted into four groups: ischemic lesions, demyelinating disease lesions, tumors, and no lesions. White matter gliosis and cerebral infarcts were included in the ischemic lesion group. The medical histories of the patients were acquired from medical records. The chi-squared test was used to analyze the relationship between age and cranial MRI images and to analyze the relationship between the image and paresis type. The statistical significance threshold was set at $p<0.05$, unless otherwise stated.

RESULTS: Ischemic MRI images were the most common image type seen in our study. Third nerve paresis was significantly correlated with ischemic cerebral lesions observed by MRI ($p=0.009$). Furthermore, lesions were significantly correlated with patients aged above 50 years ($p=0.004$). There were no significant correlations between fourth or sixth nerve paresis and cranial ischemic images ($p=0.680$ and $p=0.678$, respectively). There were two instances of cerebral artery aneurysm, three instances of cerebral infarct, and one instance of intracranial mass, all in patients aged over 50 years.

CONCLUSION: Although our patients had minimal or nonexistent neurological symptoms, some had serious cranial pathologies. These pathologies were commonly seen in patients aged over 50 years. We recommend performing MRI on all patients with binocular diplopia.

KEYWORDS: Magnetic resonance imaging, Diplopia, Cranial nerve diseases

INTRODUCTION

Diplopia is a very serious condition in adults. Ocular, orbital, and central nervous system diseases are among the causes behind this condition. In diplopia with restrictive strabismus, most cases are of congenital, endocrine, postparalytic, traumatic, or myopathic origin (3). Monocular diplopia can be seen in ocular media opacities and diseases of the macula. The diagnosis of these conditions is out of the scope of this study. Magnetic resonance imaging (MRI) is an effective and safe method for the diagnosis of the underlying pathology behind acute acquired binocular diplopia (10). The technology of MRI is very suitable for detecting brain demyelination, infarction, infections, and neoplasms (9). However, performing this procedure in every patient with diplopia is controversial because of its cost (5). In this study, we aimed to analyze cranial MRI results from adult patients complaining from acute double vision, who were diagnosed with cranial nerve palsy. In doing so, we wanted to analyze the relationships between different palsies and the corresponding image results and determine whether MRI should be mandatory for every patient.

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MATERIAL and METHODS

All the research reported in this study adhered to the World Medical Association Declaration of Helsinki. Patients who were applied our clinic between 1 January 2015 - 1 January 2017 complaining from double vision lasting up to four weeks were examined initially in order to differentiate their conditions into monocular or binocular diplopia. Visual acuity tests were performed using a Snellen chart after refractive errors were corrected. Anterior segment examinations were performed with a slit lamp biomicroscope, and posterior segment examinations were performed using a 90 D examination lens. Following these examinations, a pen torch was used to observe the corneal reflexes, and a cover–uncover test was performed from 50 cm. For all nine cardinal ocular positions, areas of increased diplopia were identified. If hypertropia was found, it was first determined which eye was paretic. Next, it was observed whether hypertropia increased with right or left gaze. Finally, it was determined whether hypertropia increased with left or right head tilt. Patients with monocular diplopia, those who had previously had ocular trauma, and those who had previously undergone orbital or ocular surgery were excluded from the study.

In total, 83 patients were included in the study. A neurological consultation was requested for all patients, and MRI was requested for all patients by neurologists. The image results were sorted into four groups: ischemic lesions, demyelinating disease lesions, tumors, and no lesion. White matter gliosis and cerebral infarcts were included in the ischemic lesion group. The medical histories of the patient were acquired from medical records. The chi-squared test was used to analyze the relationship between age and cranial MRI images and to analyze the relationship between the image and paresis type. The statistical significance threshold was set at $p<0.05$, unless otherwise stated.

RESULTS

Most MRI images assessed in this study were sorted into the ischemic group. 42 of the patients sorted into this group were over the age of 50, and 10 were younger. In total, 36 females and 49 males were included in the study. Their ages ranged between 18 and 86 years, with a mean age of 58.58 ± 16.28 years.

The mean age of the “no lesion” group was lower than the overall mean of all groups (48 ± 6.58 years). The MRI images taken in different paresis types are shown in Table I. Third-nerve paresis was found to be significantly correlated with the MRI images of ischemic lesions ($p=0.009$). Furthermore, these images were also significantly correlated with patients aged over 50 ($p=0.004$). There were no significant correlations between sixth- and fourth-nerve paresis and images of cranial ischemic lesions ($p=0.680$ and $p=0.678$, respectively). Hypertension was the most commonly observed systemic disease in patients with ischemic MRI images. Systemic diseases in different paresis types are shown in Table II. In the tumor group, one patient had a ventricular mass, one had an arachnoid cyst, one had a meningioma, one had a metastatic mass from breast cancer and one from seminoma, one had a parasellar hemangioma, and one had a clivus meningioma. Twenty seven patients from the ischemic group, all of whom were above 50 years of age, had diabetes mellitus or hypertension. Only three patients below 50 years of age in the ischemic group had either of these conditions.

DISCUSSION

In previous studies, there was a lack of consensus on which ocular cranial nerve is the most commonly affected by such disorders and also on the underlying causes. O’Colmain et al. previously reported that sixth-nerve palsies were the most

Table I: Cranial Nerve Paresis Seen in all Cranial MRI Results

	Ischemic lesions group	Intracranial mass group	Degenerative disease group	No lesion
Third nerve palsy	25	2	4	6
Fourth nerve palsy	6	-	1	5
Sixth nerve palsy	16	8	2	5

Table II: Systemic Diseases Found with Ocular Nerve Palsies

	Oculomotor Nerve Palsy	Trochlear Nerve Palsy	Abdusence Nerve Palsy
Diabetes Mellitus	10	-	7
Hypertension	13	2	7
Heart Failure	-	-	2
Asthma	2	-	2
Hypothyroidism	2	-	2
Homocystinuria	1	-	-

common type observed by their team and that the cause was microvascular in 26.2% of their patients. They used MRI on 31% of their patients (7). Richards et al. previously reported one of the largest case series. However, in this study, all age groups and all underlying reasons were included, and no MRI results were reported (9). They found that third nerve paresis was closely related to ischemia (71% of patients with third-nerve paresis had an ischemic cranial MRI image). Our findings were similar; the results indicate a statistically significant correlation between third-cranial-nerve paresis and ischemia. Conversely, Patel et al. found that sixth-nerve palsy was the most common in the presumed ischemic group, associated with diabetes and hypertension (8). Sixth-nerve palsy was the second most common nerve palsy observed in the ischemic lesion group in our study; however, it was not significantly associated with ischemia.

Hypertension and diabetes are risk factors for cerebrovascular ischemic diseases. Isolated nerve palsies were found to be significantly associated with microvascular ischemia. In our study, in almost 56% of the patients (47 patients), the MRI results were related to ischemia. Fifteen of our patients had hypertension and 13 had diabetes mellitus. These diseases seem to be important risk factors in our cases, too. Homocystinuria can cause vascular occlusion, which was observed in one patient in this group. In previous studies, age was an important factor in determining whether or not to perform MRI for ocular cranial nerve palsy. Common practice is always to perform cranial radiological imaging in patients under the age of 50 years, except in cases in which a demyelinating disease or vasculitis is present in the medical history. Therefore, our patients were grouped as either below or above 50 years of age for the sake of statistical analysis. Generally, it is controversial to perform MRI for every patient. O'Colmain et al. performed it in their study when there were neurologic symptoms, multiple palsies, or papilledema (7). Murchison et al. included in their study 93 patients with ocular nerve palsies who were over 50 years of age and showed no neurological symptoms. They concluded that only 4.3% of their patients had abnormal images; it was concluded that microvascular occlusion is the underlying reason behind most of the instances of palsy. Therefore, they argued that there is no need for cranial imaging for every patient (6). Conversely, Bendzus et al. found lesions in 63% of patients with sixth nerve palsy, 49% of whom had cranial tumors. Presumed microvasculopathy was apparent in 15% of the cases in this study. Therefore, MRI imaging was suggested for every patient (1).

In Tamhankar et al.'s case series involving 109 patients, they found that 82% of cases with ocular cranial nerve palsies were related to presumed microvascular ischemia; however, other causes such as giant cell arteritis, cerebral infarcts, and neoplasms were also observed. They also concluded that cranial MRI should be performed for all patients, regardless of their age (11). Dosunmu et al. found in their study that most fourth nerve palsies were associated with trauma and that ischemia was seen in 18% of the patients (2), however we excluded the patients with trauma from our study. In fourth nerve palsy, ischemic lesions were seen in 50% of the patients; however, systemic diseases were seen only in two patients with fourth nerve palsy. Some clinics, including ours, refer patients to neurologists (4). Neurologists prefer performing MRI in contrast to ophthalmologists. We requested a neurological consultation for all patients in order to prevent the misdiagnosis of neurological symptoms. During the neurological examinations, tandem walking impairment was observed in two patients, in addition to ataxia in another two patients. Two patients had a cerebral arterial aneurysm, three patients had a cerebral infarct, and one patient had an intracranial mass, all of whom were over 50 years of age. We found cerebral ischemic changes and infarct in four patients under 50 years of age. Considering these results, we suggest that ocular cranial nerve palsies resulting from ischemia may also be seen in the productive period.

Our patients had nonexistent or minimal neurological symptoms. Despite this, some had serious cerebral problems. Therefore, we recommend performing MRI for all patients with acute diplopia with isolated cranial nerve palsy in order to prevent misdiagnoses.

CONCLUSION

In previous studies, it was concluded that the underlying cause behind most cases of acute acquired diplopia was microvascular occlusion and that MRI should not be performed in people over 50 years of age with no history of cancer and no neurological symptoms. For neurological symptoms, a neurological consultation is recommended. Neurologists perform MRI more often than ophthalmologists for patients with diplopia. Performing this expensive imaging procedure may not be economical for all patients with acute acquired diplopia; however, in our results, we found that these patients may have serious cranial problems that require attention, yet without neurological symptoms. As a result, these patients might be misdiagnosed, which is unacceptable and might lead to medicolegal problems for clinicians.

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