Magnetic Source Imaging Analysis of the Rehabilitation Process of Brain Neurological Motion Dysfunction

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Abstract: To analyze the rehabilitation process of brain neurological motion dysfunction by using magnetic source imaging, and to provide reference for the treatment of patients with brain neurological motion dysfunction. Methods: Thirty-four patients who underwent rehabilitation of brain neurological motion dysfunction in our hospital were selected as research subjects. They were randomly divided into experimental group and control group according to their age. The average age of the two groups was 60.4±11.7, and the average disease duration was 9.7. ±4.2 years. The difference in brain neurological motion dysfunction between the two groups of patients were mainly analyzed. Result: The incidence of patients treated with magnetic source imaging in the experimental group was lower; the incidence of patients in the control group was higher. Conclusion: Magnetic source imaging has a significant effect on the analysis of patients with brain neurological motion dysfunction.

Keywords: Brain neurological motion dysfunction; Magnetic source imaging; Clinical treatment; Disease

1. Introduction

Brain neurological motion dysfunction perplex patients for a long time, especially in the middle and late stages, it is significant. Currentlly, there are many treatment methods for brain neurological motion dysfunction, patients can gradually recover through rehabilitation treatment. The theory of plasticity of brain and spinal cord is the basis of rehabilitation treatment for brain neurological motion dysfunction. Relevant studies have shown that in the early stage of the disease, the nerve cells remaining in the damaged part of the brain still have nerve impulses, but the impulses are not enough to cause the movement of the corresponding muscles. Five weeks after the onset of the disease, because the affected limbs can not move, there is no corresponding nerve impulses are transmitted into the brain, resulting in the death of brain cells remaining in the damaged part. Therefore, in the process of rehabilitation treatment, auxiliary exercise should be emphasized in thr early time to avoid the remaining brain cells losing motor function. Related studies have confirmed that early rehabilitation intervention can significantly improve the motor function of patients with brain neurological motion dysfunction. Compared with mild patients, improving their quality of life has a positive effect on patients. Moreover, early rehabilitation treatment has great benefits in promoting the functional rehabilitation of affected limbs. Compared with simple drug treatment and exercise, the effect is more obvious.

Conventional rehabilitation methods mainly focus on encouraging patients to use the healthy side as compensation. This method is conducive to helping patients recover motor function, but the effect is unsatisfactory. In recent years, some rehabilitation workers at home and abroad have begun to try new methods in clinic. In clinical treatment, different rehabilitation methods have been used for comprehensive treatment, and obvious effects have been achieved. Some scholars have also pointed out that in the rehabilitation process of brain neurological motion dysfunction, attention should be paid to protecting the patient's brain neural network, so as to achieve comprehensive rehabilitation. The use of magnetic source imaging can analyze the state of rehabilitation of brain neurological motion dysfunction through graph theory analysis method, which can provide a favorable basis for understanding the dysfunction of patients. To this end, the magnetic source imaging analysis of the rehabilitation process of brain neurological motion dysfunction is proposed.

2. Data and Methods

Thirty-four patients who underwent rehabilitation of brain neurological motion dysfunction in our hospital were selected as research subjects. They were randomly divided into experimental group and control group according to their age. The average age of the two groups was 60.4±11.7, and the average disease duration was 9.7. ±4.2 years. The control group was treated with conventional methods, while the experimental group was treated with magnetic source imaging to analyze the rehabilitatio process of patients with brain neurological motion dysfunction, as shown in Table 1.

Table 1. Patient data characteristics

Item	Age	All the patients（n=34）
Age (years old)	Average age	60.4±11.7
	Maximum age	83
	Minimum age	39
	Average duration	9.7±4.2
Duration (year)	Maximum duration	20
	Minimum duration	3
Gender (person)	Male	17
	Female	18

In the process of screening cases, the following conditions should be met. First, the conventional rehabilitation treatment method has been used, which has obvious effects. Second, the superposition syndrome of brain neurological motion dysfunction caused by various reasons should be excluded. Third, the duration of disease should be longer than three years. Fourth, the unified score should be adopted, and the motion item score is more than 30 points. Fifth, diseases that may cause surgery failure, such as diabetes, should be excluded.

3. Surgical Intervention

On the day of surgery, under the condition of local anesthesia, the CRW stereotactic head drive should be installed, the head drive base should be parallel to the reference plane, and the head drive center line should overlap with the median sagittal plane. The scanning layer is 1mm, and the scanning range should cover the skull base, and the scanning direction should be parallel to the reference surface. According to the surgical plan, the system workstation registers and fused the magnetic source imaging [1].

The target position is designed by direct positioning of the nuclear magnetic resonance image and indirect positioning with empirical coordinates. The electrode implantation position is very critical during the surgery. For patients with cranial nerve activity disorder, if one side of the limb has symptoms, the other side of the limb will also have symptoms. If the bilateral limbs symptoms are asymmetric or have obvious lateral differences, it is necessary to select the correct position of electrode implantation according to the patient's condition, otherwise the effect of using the electrode will be affected. In the course of surgery, if the symptoms are more serious, it is necessary to insert an electrode into the contralateral brain target nucleus of the limb, and insert the electrode into the remaining side target nucleus as the second side electrode. For patients whose laterality is not obvious, the left side brain target nucleus should be implanted as the first side electrode [2].

In the postoperative magnetic source reexamination, the preoperative MRI image should be taken as the blueprint, and preoperative, intraoperative and postoperative images should be fused.

4. Statistical Method

The measurement variables were expressed as mean ± standard deviation, and the coordinate deviation between the preoperative target and the postoperative electrode position was calculated by using SPPSS 19.0 software.

5. Results

The coordinate deviation distance between the intraoperative electrode position and the preoperative target, the postoperative electrode position and the preoperative target point, the postoperative electrode position and the intraoperative electrode position in the three-dimensional orthogonal coordinate system of the two treatment methods is obtained. The experimental results are shown in Table 2.

Table 2. Coordinate deviation distance of motor position during the rehabilitation process of brain neurological motion dysfunction

Group	Side	The amount of data n	Mean ± standard deviation	Lower limit	Upper limit	Minimum value	Maximum value
Control group	1	35	0.79±0.56	0.60	0.95	0.0	2.1
	2	35	0.79±0.56	0.95	1.03	0.0	2.1
	1	35	0.99±0.79	0.26	0.59	0.1	3.0
	2	35	0.87±0.59	0.59	0.65	0.2	3.2
Experimental group	1	35	0.93±0.59	0.26	0.60	0.1	2.0
	2	35	1.12±0.59	0.80	1.02	0.0	1.0
	1	35	1.11±0.95	0.70	0.90	0.1	3.3

	2	35	0.84±0.59	0.59	0.65	0.2	3.2

Wherein, side 1 represents the first side electrode, and side 2 represents the second side electrode [3].

From the above numerical comparison results, it can be seen that in comparing the postoperative electrode position with the preoperative target, the postoperative electrode depth of most of the electrodes in the bilateral electrodes is deeper than that of the preoperative target position. It shows that patients with magnetic source imaging analysis have better rehabilitation results.

6. Discussion

6.1. Analysis of magnetic source imaging for primary somatosensory cortex of patients with brain neurological motion dysfunction

In 1968, a magnetically shielded room was set up at the Massachusetts Institute of Technology, and a device similar to an induction coil was used to measure the brain's a-rhythm spontaneous brain magnetic field. Later, a superconducting quantum interferometer was invented to achieve the measurement of weak magnetic field. In this study, the magnetic source imaging analysis of the rehabilitation process of brain neurological motion dysfunction is aimed at the physiological changes that occur when axons are transmitted to the synapse. The characteristics of the brain neurons are recorded to measure the rehabilitation of the patients. Magnetic source imaging can record the characteristics of neuronal activity of patients. First, the magnetic field is not affected by scalp soft tissue [4]. Second, in the process of detecting the source, errors are prone to occur. The range of errors is less than several millimeters, and the spatial resolution is good. Third, the magnetic source imaging can directly measure the electrophysiological changes of the brain, and record the changes of neurophysiology in real time in milliseconds, which shows that magnetic source imaging has good temporal resolution. Fourth, the magnetic source imaging can only measure the magnetic field produced by currents that are tangent to the surface of the scalp. Fifth, magnetic source imaging does not harm the patient's body, so it is more convenient to detect.

The peak value of the primary somatosensory response was at 20 ms, 35 ms. This experiment is based on the conclusion of the paper on the effect of ISI on somatosensory induced magnetic field conducted by Wikstrom et al. In the treatment of patients with brain neurological motion dysfunction, the minimum time period of influence of MRI on M20 was 0.3-0.5 seconds when electrical stimulation on median nerve was performed. Therefore, in the experiment, electrical stimulation on the median nerve was performed when the MRI is selected for 0.5 seconds, which can shorten the examination time and will not affect the acquisition of the peak value of M20 [5]. In the experiment, M20 and M35 were found in both left and right hemispheres of all patients. M60 was found only in two patients, and no M60 was found in the others. It may be caused by short MRI, but it does not affect the precise localization of somatosensory cortex. If we want to accurately locate the primary somatosensory cortex [6], we only need to superimpose M20 peak and ECD on MRI. By observing and analyzing the magnetic source images of all patients, it can be concluded that the first is that the magnetic source images can accurately provide the location of somatosensory functional areas of the brain; the second is that the primary somatosensory cortex of all patients is located in the middle of the central back, as shown in Figure 1.

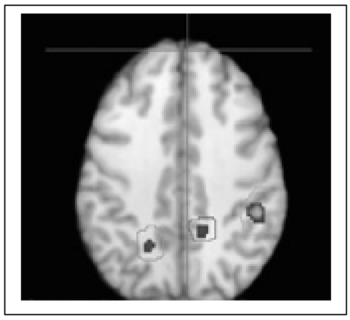

Figure 1. Magnetic source imaging of the primary somatosensory cortex in a patient

The magnetic sources of M20 and M35 in the same patient are close, and they are located in the middle of the central back, as shown in Figure 2.

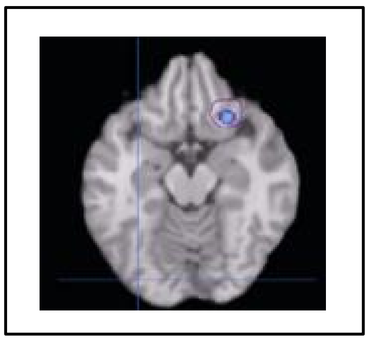

Figure 2. Magnetic source imaging of the same patient

In this experiment, the maximum difference between M20 and M35 is 7.9 mm on X axis, 6.59 mm on Y axis and 7.1 mm on Z axis, as shown in Table 3.

Table 3. Differences in absolute values

Number of people	Difference in the left hemisphere(mm)			Difference in the right hemisphere(mm)		
	X	Y	Z	X	Y	Z
0~5	6.0	1.0	2.8	0.6	0.2	2.2
5~10	2.0	1.3	1.6	0.9	0.9	5.6
10~15	3.0	5.2	6.2	1.6	3.1	4.2
15~20	4.5	4.2	5.2	1.3	4.6	6.2
20~25	6.2	3.5	3.1	1.5	6.0	1.2
25~30	1.2	3.9	4.6	1.9	5.2	5.6
30~34	5.0	1.6	2.3	3.2	8.2	4.6

The advantage of magnetic source imaging is that it can directly measure the physiological changes of the brain, rather than the changes of brain metabolism and hemodynamics. In addition, it can record neurophysiological changes in real time and in milliseconds, while FMRI requires several seconds of delay. Its biggest disadvantage is that when performing traumatic examination, it needs to expand the scope of craniotomy and prolong the operation time. In general, patients will not choose this treatment [7].

6.2. Analysis of advanced somatosensory cortex in patients with brain neurological motion dysfunction by magnetic source imaging

Brain neurological motion dysfunction in patients is caused by damage to the central nervous system, especially the nerves that control motor and speech functions. If brain tissue is damaged, many kinds of serious dysfunction are easy to occur, of which dyskinesia is the most common. In the brain nerve activity disorder, the central hemiplegia of the contralateral limbs caused by the lesion of the cerebral hemisphere is mainly manifested as the increase of extensor tension of the lower limbs, which leads to the formation of hemiplegic and specific posture of hip adduction and finger flexion of the lower limbs. In the early stages of the disease, the patient feels weakness, soft palate, and then gradually becomes a hard sputum characterized by increased muscle tone, which is the so-called brain neurological motion dysfunction. In addition, patients with brain neurological motion dysfunction also have abnormal movement patterns such as joint reactions [8]. The original normal nerve reflex can also become hyperactive, and the most obvious is the loss of coordination and balance of movement. The main cause of brain neurological motion dysfunction is abnormality of the nerve reflex of the spinal cord due to damage to the high central nervous system.

In addition to the above-mentioned large abnormal movement patterns, patients with brain neurological motion dysfunction also have other movement dysfunctions such as hyperreflexia and dysfunction of movement coordination and control, as shown in Table 4.

Table 4. List of brain neurological motion dysfunction

Name of dysfunction	Manifestation
Hyperreflexia	The coordination function between the high-level center and the low-level center is destroyed, especially the loss of control power of the high-level center.
	Physical coordination
Dystonia	Muscular tension is too low in early brain neurological motion dysfunction
	After 3 weeks of cranial nerve dysfunction, muscular tension increased.
Dysfunction of movement coordination and control	The patient's advanced neurological inhibition gradually diminished
	Loss of the ability to coordinate and control between muscle groups
Balance dysfunction	Balance dysfunction

Brain neurological motion dysfunction can cause communication dysfunction characterized by aphasia. Relevant studies have shown that the connections between central nervous cells are constantly changing, and there are latent conduction pathways [9]. Damage to the central nervous system can cause limb dysfunction, which is caused by the loss of control of the limb after damage to the cranial nerves and spinal cord. This drive is based on signals from brain and spinal cord cells. If one of the links fails, the electrical signal will weaken, which will cause the muscles to lose control. In order to solve this problem, it is necessary to establish a model of the distribution intensity of the signal, so that various parts of the link return to normal. Only by improving the function of the limbs can the patient be relieved of the symptoms of brain neurological motion dysfunction [10].

The magnetic source image can detect the static and weak electrical signal of muscle and the weak change of the signal during contraction. It should be detected in real time in the course of treatment, which can be used as experimental parameters to determine whether rehabilitation treatment can be given. Through the observation of clinical rehabilitation treatment, it can be concluded that magnetic source imaging can be a good analysis of the rehabilitation of patients with brain neurological motion dysfunction. Magnetic resonance imaging can be used to observe the rehabilitation of patients, both in the early stages of the disease and in periods of unconsciousness[11]. At the same time, conventional treatment methods can be used, but the effect is relatively poor.

In summary, magnetic imaging can well observe the rehabilitation process of patients with brain neurological motion dysfunction, and it is safe and effective, which is worth promoting.

7. Conclusion

The magnetic source image is an image obtained by MEG and obtained by brain electrophysiological activity and superimposed by anatomical structure. This paper uses magnetic imaging to analyze the rehabilitation process of patients with brain neurological motion dysfunction. Magnetic source imaging can accurately analyze the rehabilitation of patients with brain neurological motion dysfunction and provide a theoretical basis for further clinical treatment.

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