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神经电生理刺激对脑卒中患者脊髓运动神经元的影响*

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摘要 目的:探讨神经电生理刺激对脑卒中患者脊髓运动神经元的影响。**方法:**2015年9月至2018年2月选择在本院神经内科病房诊治的脑卒中患者160例,根据入院顺序随机分为研究组与对照组,各80例。对照组给予常规治疗,研究组在对照组治疗的基础上给予神经电生理刺激治疗,两组都治疗观察14d,记录脊髓运动神经功能变化情况。**结果:**两组治疗后14d,患者的认知障碍、焦虑抑郁情绪、双下肢无力,步态不稳均得到了改善,研究组的一般情况的改善情况更加明显,主要体现在认知和情绪方面。两组治疗14d后的脊髓运动神经评分都显著高于治疗前($P<0.05$),研究组也显著高于对照组($P<0.05$)。治疗后两组的脑电诱发电位波幅都显著高于治疗前($P<0.05$),研究组也显著高于对照组($P<0.05$),两组治疗前后潜伏期对比差异无统计学意义($P>0.05$)。研究组治疗期间的肺部感染、颅内感染、迟发性颅内血肿等并发症发生率为3.8%,对照组为5.0%,对比差异无统计学意义($P>0.05$)。随访至今(2019年8月),研究组的预后恢复情况显著好于对照组($P<0.05$)。**结论:**电生理刺激在脑卒中患者的应用能促进恢复脊髓运动神经元功能,改善脑电活动功能,提高认知功能,减少并发症和焦虑情绪的发生,改善患者的预后恢复。

关键词:神经电生理刺激;脑卒中;脊髓运动;神经元;脑电活动功能

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Effect of Neurophysiological Stimulation on Spinal Motor Neurons in Stroke Patients*

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ABSTRACT Objective: To investigate the effects of neurophysiological stimulation on spinal motor neurons in stroke patients. **Methods:** From September 2015 to February 2018, 160 patients with stroke who were treated in the neurology department of our hospital were randomly divided into the study group and control group according to the order of admission, 80 cases each. The control group received routine treatment, and the study group received neuroelectrophysiological stimulation on the basis of the control group. Two groups were treated for 14 d, and the changes of spinal motor nerve function were recorded. **Results:** At 14 d after treatment, the cognitive impairment, anxiety and depression, weakness of both lower limbs, and gait instability were improved. The improvement of the general situation of the study group was more obvious, mainly in terms of cognition and emotion. The spinal motor nerve scores of the two groups after treatment for 14 d were significantly higher than those before treatment ($P<0.05$), and the study group was significantly higher than the control group ($P<0.05$). The EEG evoked potential amplitudes of the two groups after treatment were significantly higher than those before treatment ($P<0.05$), and the study group was also significantly higher than the control group ($P<0.05$). There were no statistical difference in latency between the two groups before and after treatment ($P>0.05$). The incidence of complications such as pulmonary infection, intracranial infection, and delayed intracranial hematoma was 3.8 % in the study group and 5.0 % in the control group, there was no significant difference between the two groups ($P>0.05$). After the followed-up (August 2019), the prognosis of the study group were significantly better than the control group ($P<0.05$). **Conclusion:** The application of neuroelectrophysiological stimulation in stroke patients can promote the recovery of spinal motor neuron function, improve the function of EEG activity, improve

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cognitive function, reduce the occurrence of complications and anxiety, and improve the prognosis of patients.

Key words: Neurophysiological stimulation; Stroke; Spinal cord movement; Neuron; Brain electrical activity

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前言

近年来脑血管病发生率呈不断上升趋势,对家庭和社会造成沉重的负担。脑卒中是常见的脑血管病,具有发病率高、致残率高、病死高等特点,严重影响人们身心健康和生活质量^[1,2]。随着医疗技术的进步,脑卒中的死亡率有了显著下降,但是致残率一直居高不下^[3]。现代研究发现脑卒中后的脊髓运动障碍是加重病情、引起激发其他组织器官损伤的重要因素^[4,5]。特别是由于脑卒中产生大量的血管活性物质可使血管收缩,引起脑灌注压增高,导致血流速度增快,可使得脊髓运动障碍,为此在临床上的治疗需要积极重建脊髓运动神经元^[6,7]。脑电活动是客观反映神经功能的客观指标,特别是经神经电刺激运动诱发电位可以及时准确地反映运动神经系统通路的完整性,从而能够指导功能重建^[8,9]。神经电生理刺激是根据大脑皮层的功能性定位,在头皮上划出相应的刺激区进行针灸与电刺激,可透过其大脑皮层刺激反射治疗其所支配的器官与部位^[10]。该方法体现了整体与局部相结合的原则,能充分激发小脑及大脑皮层的生

理功能,有效缓解患者的临床症状^[11]。本文具体探讨了神经电生理刺激对脑卒中患者脊髓运动神经元的影响,为后续研究其机制提供基础。现总结报道如下。

1 临床资料

1.1 研究对象

2015年9月到2018年2月选择在本院神经内科病房诊治的脑卒中患者160例作为研究对象,纳入标准:符合脑卒中相关诊断标准,且经颅CT或者MRI证实;预计生存期大于3个月;患者年龄30-85岁,神志清醒,病情稳定;研究得到医院伦理委员会的批准;临床资料完整,配合此次研究并顺利完成。排除标准:合并严重肺、肾、肝等功能严重异常者;重度认知功能障碍、完全性失语等不能配合治疗者;妊娠期及哺乳期妇女;既往存在脑卒中病史且遗留肢体功能障碍者;恶性肿瘤、颅脑手术及蛛网膜下腔出血等。根据入院顺序随机分为研究组与对照组各80例,两组的性别、年龄、体重指数、发病到诊治时间及偏瘫部位等对比差异无统计学意义($P>0.05$)。见表1。

表1 两组一般资料对比

Table 1 Comparison of general data between the two groups

Groups	n	BMI (kg/m ²)	Old (years)	Gender (male /female)	Onset to diagnosis and treatment time (h)	Hemiplegia (right/left)
Study group	80	22.45± 3.14	45.13± 5.09	45/35	12.19± 1.39	36/44
Control group	80	22.11± 4.59	45.33± 4.19	42/38	12.22± 1.02	35/45

1.2 治疗方法

对照组:入院后均采用常规治疗,包括抗血小板聚集、降脂、降压、改善脑供血、维持水电解质平衡和酸碱平衡。

研究组:在对照组治疗的基础上给予神经电生理刺激治疗,取头部顶区和顶前区,表明消毒,采用29号0.5寸不锈钢毫针(用苏州医疗用品厂华佗牌)平行刺至帽状腱膜下1.5寸,每区刺入3-5针;连接电刺激仪,直流电强度为1mA,20min/次,左右侧交替,间歇30min,1次/d。两组都治疗观察14d。

1.3 观察指标

(1)在治疗前后采用美国脊柱损伤协会(American Spinal Injury Association, ASIA)评分系统评定脊髓神经运动功能评定,分数越高,脊髓神经功能越好^[12]。(2)在治疗前后都行多功能脑电监护仪,记录脑电诱发电位的潜伏期和波幅,取两侧平均值作为记录数据。(3)记录所有患者在治疗期间出现的肺部感染、颅内感染、迟发性颅内血肿等。(4)随访至今(2019年8月),记录患者的病情恢复情况,分为恢复良好、重残、植物生存状态和死亡等情况。

1.4 统计方法

应用SPSS 20.00专用分析软件处理数据,计量数据结果采用均数±标准差表示,对比为t检验;而计数数据采用频数或者百分比表示,对比为卡方 χ^2 检验、秩和检验等, $P<0.05$ 认为

有统计学差异。

2 结果

2.1 两组治疗后的一般情况对比

两组治疗后14d,患者的认知障碍、焦虑抑郁情绪、双下肢无力,步态不稳均得到了改善,研究组的一般情况的改善情况更加明显,主要体现在认知和情绪方面。

2.2 脊髓运动神经评分对比

两组治疗14d后的脊髓运动神经评分都显著高于治疗前($P<0.05$),研究组也显著高于对照组($P<0.05$)。见表2。

2.3 脑电神经功能对比

治疗14d后两组的脑电诱发电位波幅都显著高于治疗前($P<0.05$),研究组也显著高于对照组($P<0.05$),两组治疗前后潜伏期对比差异无统计学意义($P>0.05$)。见表3。

2.4 并发症发生情况对比

研究组治疗期间的肺部感染、颅内感染、迟发性颅内血肿等并发症发生率为3.8%,对照组为5.0%,对比差异无统计学意义($P>0.05$)。见表4。

2.5 随访情况对比

随访至今(2019年8月),研究组的预后恢复情况显著好于对照组($P<0.05$),见表5。观察组死亡1例,主要原因是患者年

老,且出现了颅内血肿并发症。观察组死亡 5 例,1 例由肺炎引起,2 例脑卒中复发,1 例猝死,1 例肺部感染合并消化道出血。

表 2 两组治疗前后脊髓运动神经评分对比(分, $\bar{x} \pm s$)Table 2 Comparison of spinal motor nerve scores before and after treatment in the two groups (score, $\bar{x} \pm s$)

Groups	n	Pretherapy	Post-treatment
Study group	80	68.14 $\pm$ 20.49	104.11 $\pm$ 24.19* [#]
Control group	80	63.11 $\pm$ 19.84	87.02 $\pm$ 31.44*

Note: compared with the same group pretherapy, * $P < 0.05$, compared with the control group post-treatment, [#] $P < 0.05$.

表 3 两组治疗前后脑电神经功能对比 ($\bar{x} \pm s$)Table 3 Comparison of EEG nerve function before and after treatment in the two groups ($\bar{x} \pm s$)

Groups	n	Amplitude (mv)		Incubation (ms)	
		Pretherapy	Post-treatment	Pretherapy	Post-treatment
Post-treatment	80	287.55 $\pm$ 45.83	431.98 $\pm$ 44.89* [#]	22.63 $\pm$ 2.98	22.98 $\pm$ 2.74
Control group	80	285.29 $\pm$ 26.33	359.38 $\pm$ 59.33*	23.19 $\pm$ 2.08	22.91 $\pm$ 2.21

Note: compared with the same group pretherapy, * $P < 0.05$, compared with the control group post-treatment, [#] $P < 0.05$.

表 4 两组并发症发生情况对比(例, %)

Table 4 Comparison of complications between the two groups (n, %)

Groups	n	Pulmonary infection	Delayed intracranial hematomas	Intracranial infection	Total
Study group	80	1(1.3)	1(1.3)	1(1.3)	3(3.8)
Control group	80	2(2.5)	1(1.3)	1(1.3)	4(5.0)

表 5 两组随访预后对比(例, %)

Table 5 Comparison of prognosis between the two groups (n, %)

Groups	n	Good recovery	Severe disability	Plant survival state ³	Die
Study group	80	64(80.0)*	7(8.8)	(3.8)	1(1.3)
Control group	80	40(50.0)	15(18.8)	15(18.8)	5(6.3)

3 讨论

目前由于各种因素的增加,我国脑卒中的发病率呈逐年增长之势。特别是脑卒中可形成占位灶,压迫周围的大血管,使血管收缩,诱发钙离子大量内流,在细胞内不断聚集,并进一步代谢产生氧自由基,从而诱发继发性损伤^[13,14]。不过在脑卒中发生后,丰富的侧支循环可以对缺血的脑组织起保护作用,如果某一支血管发生损伤,机体可以通过侧支循环来弥补特定区域的灌注不足,也为临床治疗提供了基础^[15]。

常规药物治疗脑卒中在临床上比较常见,可解除脑血管痉挛,降低血脑屏障通透性,从而减轻血管源性脑水肿及脑组织缺血缺氧^[16]。神经电生理刺激可保护残存神经元的功能,促进神经功能的恢复^[17,18]。本研究显示两组治疗后 14 d,患者的认知障碍、焦虑抑郁情绪、双下肢无力,步态不稳均得到了改善,研究组的一般情况的改善情况更加明显,主要体现在认知和情绪方面。两组治疗后的脊髓运动神经评分都显著高于治疗前,研究组也显著高于对照组。随访至今(2019 年 8 月),研究组的预后恢复情况显著好于对照组。主要在于神经电生理刺激可通过深感觉传入神经通道再刺激大脑皮层,改善血流量和血流,使患者脑血管扩张,激活损伤中枢功能低下的神经细胞和神经纤

维,促进受损病灶的侧支循环及早建立,善因脑细胞缺血、缺氧而引致的神经功能缺损,促进感觉和运动功能区的再组织能力,从而改善了患者的认知功能和不良情绪^[19]。

脑卒中可严重影响患者日常生活活动能力和运动功能,特别是患者的脊髓运动功能会受到不同程度受损,从而影响日常生活活动能力^[20]。并且脑卒中发生后可导致脑血管可发生痉挛、麻痹或破坏,可促使自由基在大脑内大量增加,使细胞膜系统和血脑屏障损害,诱发脑代谢紊乱的发生^[21-23]。脊髓运动功能发生障碍后也可透过中枢神经系统结构上的重组和功能上的代偿,使脑细胞失去的功能恢复正常,从而严重削弱了患者的身心健康^[24]。脑电监测的解剖基础是躯体感觉与听觉的上行传导通路相互毗邻,下行的运动传导通路常与之同时受损,因而对感觉通路的监测同时也能有效地监测运动通路的功能状况^[25-27]。本研究显示治疗后两组的脑电诱发电位波幅都显著高于治疗前,研究组也显著高于对照组,两组治疗前后潜伏期对比差异无统计学意义。研究组治疗期间的肺部感染、颅内感染、迟发性颅内血肿等并发症发生率低于对照组。主要在于神经电生理刺激可调节神经传导通路上的各个神经元的兴奋性,实现大脑皮层的功能重组和功能代偿,可调整神经反射环路中各个神经元的兴奋性,从而重建患者的脊髓运动功能^[28-31]。本研究也

有一定的不足,样本数量比较少,且纳入研究的指标比较少,导致本次研究可能存在研究偏倚,将在后续研究中深入分析。

总之,神经电生理刺激在脑卒中患者的应用能促进恢复脊髓运动神经元功能,改善脑电活动功能,减少并发症的发生,改善患者的预后恢复。

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