

doi: 10.13241/j.cnki.pmb.2020.22.029

脑电仿生电刺激对缺血性脑卒中失眠症患者睡眠质量的影响*

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摘要 目的:探讨脑电仿生电刺激对缺血性脑卒中失眠症患者睡眠质量的影响。**方法:**2018年1月到2019年12月选择在新疆医科大学第六附属医院诊治的缺血性脑卒中失眠症患者120例,根据随机数字表法分为研究组与对照组各60例。对照组给予常规药物治疗,研究组在对照组治疗的基础上给予脑电仿生电刺激治疗,治疗观察4w,评定患者睡眠质量变化情况。**结果:**两组治疗后的匹兹堡睡眠质量指数量表(Pittsburgh Sleep Quality Index, PSQI)评分都显著低于治疗前($P<0.05$),研究组评分也显著低于对照组($P<0.05$)。治疗后研究组的总有效率为98.3%,显著高于对照组的85.0%($P<0.05$)。研究组治疗后的左右椎动脉血流速度都显著高于治疗前($P<0.05$),也显著高于对照组($P<0.05$)。治疗后两组的Berg平衡量表(Berg balance scale, BBS)与巴氏(Barthel)评分显著高于治疗前($P<0.05$),研究组评分也显著高于对照组($P<0.05$)。**结论:**脑电仿生电刺激在缺血性脑卒中失眠症患者中的应用能改善睡眠质量,提高恢复平衡与日常生活功能,改善脑血流速度,从而提高治疗效果。

关键词:脑电仿生电刺激;缺血性脑卒中;失眠症;睡眠质量

中图分类号:R743;Q683;R454.1 **文献标识码:**A **文章编号:**1673-6273(2020)22-4331-04

Effects of Electroencephalographic Biomimetic Stimulation on Sleep Quality in Patients with Ischemic Stroke and Insomnia*

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ABSTRACT Objective: To investigate the effects of electromyography on the sleep quality of patients with ischemic stroke and insomnia. **Methods:** From January 2018 to December 2019, 120 patients with ischemic stroke and insomnia who were selected for treatment in the sixth affiliated hospital of Xinjiang Medical University were divided into study group and control group with 60 cases each according to the random number table method. The control group were received conventional drug treatment, and the study group were given electroencephalographic biomimetic stimulation on the basis of the treatment of the control group. The treatment were observed for 4 weeks, and the changes of sleep quality were evaluated. **Results:** The Pittsburgh Sleep Quality Index (PSQI) scores of the two groups after treatment were significantly lower than those before treatment ($P<0.05$), and the study group scores were also significantly lower than the control group ($P<0.05$). The total effective rates of the study group after treatment were 98.3 %, which were significantly higher than that of the control group (85.0 %, $P<0.05$). The blood flow velocity of the left and right vertebral arteries in the study group after treatment were significantly higher than that before the treatment($P<0.05$), and were also significantly higher than the control group($P<0.05$). The Berg balance scale (BBS) and Barthel scores of the two groups after treatment were significantly higher than those before treatment($P<0.05$), and the scores of the study group were also significantly higher than the control group($P<0.05$). **Conclusion:** The application of electroencephalographic biomimetic stimulation in patients with ischemic stroke insomnia can improve the quality of sleep, improve the balance of recovery and daily life, improve the cerebral blood flow velocity, and thus improve the therapeutic effect.

Key words: Electroencephalographic biomimetic stimulation; Ischemic stroke; Insomnia; Sleep quality

Chinese Library Classification(CLC): R743; Q683; R454.1 **Document code:** A

Article ID: 1673-6273(2020)22-4331-04

前言

缺血性脑卒中是一种突然起病的脑血液循环障碍性疾病,具有致死率、复发率、发病率、致残率高等特点^[1]。缺血性脑卒中

失眠症是最常见的缺血性脑卒中并发症之一,为患者睡眠的质和(或)量得不到满足,主要表现为睡眠时间短、入睡时间长、睡眠质量差,甚至彻夜不眠等^[2,3]。失眠症不仅导致患者精神焦虑、抑郁,也不利于患者康复,加重家庭及社会的负担。常规药物治

* 基金项目:新疆维吾尔自治区自然科学基金面上项目(2018D01C316)

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(收稿日期:2020-03-07 接受日期:2020-03-30)

疗该病虽然有一定的效果,但是患者的症状容易反复发作,症状缓解不显著,为此寻找新的有效的治疗方式具有重要价值^[4,5]。脑组织受损可引起脑内抑制性神经递质 Y-氨基丁酸、5-羟色胺分泌增加,可改变睡眠结构,影响睡眠质量。脑电仿生电刺激是一种基于中医的物理治疗方法,可透过其大脑皮层刺激反射治疗其所支配的器官与部位^[6,7]。该方法可改善机体的脑循环和脑代谢,促进脑部血流速度,改善认知功能及神经功能^[8,9]。脑电仿生电刺激是利用一定强度的低频脉冲电流,通过预先设定的程序来刺激脑部,诱发或模拟正常的自主运动,以达到改善或恢复被刺激组织功能的目的^[10]。并且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^[11]。本文具体探讨了脑电仿生电刺激对缺血性脑卒中失眠症患者睡眠质量的影响,以促进改善患者的预后。现报道如下。

1 资料与方法

1.1 研究对象

2018 年 1 月至 2019 年 12 月选择在新疆医科大学第六附属医院诊治的缺血性脑卒中失眠症患者 120 例,纳入标准:头颅 CT 或 MRI 证实为缺血性脑卒中,出现失眠的患者;年龄 30~70 岁;医院伦理委员会批准了此次研究;就诊前 2 w 内未使用精神类药物,或停药 2 w 以上;患者意识清楚,知情同意本研究。排除标准:有严重的心脑肝肾功能障碍及感染等患者;脑出血、颅内占位性病变及其它脑血管疾病患者;妊娠或哺乳期妇女;临床资料缺乏者,治疗期间脱落者。根据随机数字表法分为研究组与对照组各 60 例,两组表 1 资料对比差异无统计学意义($P>0.05$)。

表 1 两组一般资料对比

Table 1 Comparison of two groups of general information

Groups	n	Gender (Male/ Female)	Age (Year)	Course of disease (year)	Basic diseases (hypertension / diabetes / heart disease)	Number of strokes (times)
Study group	60	31/29	56.33± 4.10	3.54± 1.34	14/17/3	1.98± 0.45
Control group	60	30/30	56.14± 3.94	3.29± 1.35	15/17/4	1.94± 0.51

1.2 治疗方法

对照组:给予常规药物治疗,口服舒乐安定片 2 mg/次+盐酸多奈哌齐 5 mg/次,1 次/d,治疗观察 4 w。

研究组:在对照组治疗的基础上给予脑电仿生电刺激治疗,使用上海任和医疗设备公司的 CVFT 型脑电仿生电刺激仪,在患者双侧乳突根部后方安置刺激电极并进行固定。患者取舒适卧位或坐位,轻闭双眼,给予脑电模式刺激信号,直角方波脉冲,根据患者耐受程度调节强度,刺激频率 18%。强度 90%~120%,时间 30 min,1~2 次/d,3 次/w,治疗观察 4 w。

1.3 观察指标

(1)在治疗前后采用 PSQI 评估患者的睡眠质量,该量表由 23 个条目构成,每个条目按照 0~3 分积分,分数越高,睡眠质量越差。(2)神经功能疗效:依据采用 NIHSS 进行判定,基本痊愈:NIHSS 评分减少 90%~100%;显著进步:NIHSS 减少 46%~89%;进步:NIHSS 评分减少 18%~45%。无效:NIHSS 评分

减少或增加在 18%以内甚或恶化。(3)在治疗前后进行颅超声多普勒分析,采用 TC-8080 型超声血流分析仪,使用 2 MHz 脉冲多普勒探头,记录患者双侧大脑左右椎动脉的平均血流速度。(4)在治疗前后采用 BBS 与 Barthel 评分评定患者的平衡与日常生活功能,BBS 量表满分为 56 分,得分越高,平衡功能越好;Barthel 指数满分为 100 分,得分越高,日常生活能力越强。

1.4 统计方法

应用 SPSS 20.00,计量数据对比采用 t 检验(以表示),计数资料对比采用 χ^2 分析(百分比表示),检验水准为 $\alpha=0.05$, $P<0.05$ 差异有统计学意义。

2 结果

2.1 PSQI 评分对比

两组治疗后的 PSQI 评分都显著低于治疗前 ($P<0.05$),研究组评分也显著低于对照组 ($P<0.05$),见表 2。

表 2 两组治疗前后 PSQI 评分对比(分, $\bar{x} \pm s$)

Table 2 Comparison of PSQI scores before and after treatment between the two groups (scores, $\bar{x} \pm s$)

Groups	n	Before treatment	After treatment
Study group	60	34.19± 2.18	7.89± 1.47 ^{*#}
Control group	60	33.79± 1.48	14.92± 2.71 [#]

Note: Compared with the control group, ^{*} $P<0.05$, compared with the same group before treatment, [#] $P<0.05$.

2.2 总有效率对比

治疗后研究组的总有效率为 98.3%,显著高于对照组的 85.0% ($P<0.05$),见表 3。

2.3 脑部血流速度变化对比

研究组治疗后的左右椎动脉血流速度都显著高于治疗前

($P<0.05$),也显著高于对照组 ($P<0.05$),见表 4。

2.4 BBS 与 Barthel 评分对比

治疗后两组的 BBS 与 Barthel 评分显著高于治疗前 ($P<0.05$),研究组评分也显著高于对照组 ($P<0.05$),见表 5。

3 讨论

缺血性脑卒中是一种发病率及致残率均较高的脑血管疾病,随着医学技术的进步,该病的死亡率有所下降,但是很多患者伴随有失眠症,不仅影响患者的日常生活能力,也不利于患者康复,故开展研究改善缺血性脑卒中失眠症的干预手段具有重要意义^[12,13]。从发病机制上分析,当病灶累及与睡眠相关脑组织,

可导致机体发生一系列的病理生理改变,从而导致睡眠结构紊乱^[14]。并且脑组织受损可引起脑内抑制性神经递质 Y- 氨基丁酸、5- 羟色胺分泌增加,可改变睡眠结构,影响睡眠质量^[15]。而睡眠质量差可导致人体正常内分泌激素分泌紊乱,从而形成恶性循环^[16]。

表 3 两组治疗后总有效率对比(例,%)

Table 3 Comparison of total effective rates after treatment between the two groups (n,%)

Groups	n	Basically healed	Significant progress	Progress	Invalid	Total efficiency
Study group	60	34	20	5	1	59(98.3)*
Control group	60	20	20	11	9	51(85.0)

Note: Compared with the control group, * $P<0.05$.

表 4 两组治疗前后脑部血流速度变化对比(cm/s , $\bar{x} \pm s$)Table 4 Comparison of changes in brain blood flow velocity before and after treatment between the two groups (cm/s , $\bar{x} \pm s$)

Groups	n	Left vertebral artery		Right vertebral artery	
		Before treatment	After treatment	Before treatment	After treatment
Study group	60	56.22 $\pm$ 9.13	62.47 $\pm$ 7.18#*	54.87 $\pm$ 5.66	64.29 $\pm$ 8.14#*
Control group	60	56.02 $\pm$ 8.73	57.00 $\pm$ 4.58	54.48 $\pm$ 4.17	55.02 $\pm$ 4.89

表 5 两组治疗前后 BBS 与 Barthel 评分对比(分, $\bar{x} \pm s$)Table 5 Comparison of BBS and Barthel scores before and after treatment between the two groups (scores, $\bar{x} \pm s$)

Groups	n	BBS scores		Barthel scores	
		Before treatment	After treatment	Before treatment	After treatment
Study group	60	22.30 $\pm$ 4.29	36.42 $\pm$ 4.14#*	45.30 $\pm$ 6.46	72.40 $\pm$ 7.15#*
Control group	60	22.98 $\pm$ 3.78	30.24 $\pm$ 3.40#	45.10 $\pm$ 6.11	64.40 $\pm$ 6.36#

本研究显示两组治疗后的 PSQI 评分都显著低于治疗前,研究组评分也显著低于对照组;治疗后研究组的总有效率为 98.3%,显著高于对照组的 85.0%,与目前国内学者何志磊^[17]等人的研究类似,通过脑电仿生电刺激治疗失眠症患者,发现脑电仿生电刺激可明显改善失眠症患者的睡眠质量,显著提高治疗效果;同时,Liu^[18]等学者应用小脑顶核刺激治疗中风后睡眠障碍的临床研究,治疗 4 w 后,发现治疗组治疗的 PSQI 评分明显低于对照组,说明小脑顶核刺激可安全有效地改善中风后睡眠障碍患者的睡眠质量,可作为治疗中风后睡眠障碍的辅助方法之一,与本研究的结论一致,但是不同之处在于作用的位置不同。国外学者对于缺血性脑卒中失眠症患者的治疗主要采取经皮神经电刺激和经皮神经肌肉电刺激^[19],与本研究的刺激原理和部位有所不同。上述结果均表明脑电仿生电刺激治疗能缓解患者的睡眠障碍,提高治疗效果。分析其主要原因为脑电仿生电刺激是利用一定强度的低频脉冲电流,通过预先设定的程序来刺激脑部,诱发或模拟正常的自主运动,以达到改善或恢复被刺激组织功能的目的^[19]。并且该方法可通过脑干网状结构和纹状体影响脑皮质血管舒张中枢,显著增加损伤局部及额、顶叶脑血流量,引起脑血管扩张,兴奋皮层,缓解脑组织缺氧,有利于神经细胞代谢及功能改善,从而达到改善皮质血流的目的^[20]。

本研究显示研究组治疗后的左右椎动脉血流速度都显著

高于治疗前,也显著高于对照组。倪莹莹^[21]学者的研究与本研究类似,通过脑电仿生电刺激对持续植物状态患者脑血流速度和脑代谢的分析,显示脑电仿生电刺激完骨、天柱、内关可明显改善持续植物状态患者脑循环及脑代谢,有可能提高临床促醒疗效,分析其原因可能与脑电仿生电刺激可舒张脑皮质血管与增加脑血流量,进而改善脑皮质血流,进而促进脑功能恢复^[22]。缺血性脑卒中的本质是脑局部血液循环障碍而引起的局灶性神经功能缺损,可直接影响日常生活活动能力及身心健康^[23-25]。脑电仿生电刺激疗法可刺激与睡眠相关的神经中枢,激活相关脑区,促进睡眠-觉醒周期恢复正常^[26,27]。并且该方法可促使神经系统发生条件反射,激活神经系统固有的保护机制,提高血流速度,改善血液循环、通畅血管^[28,29]。

本研究显示,治疗后两组的 BBS 与 Barthel 评分显著高于治疗前,研究组评分也显著高于对照组,与高鹤^[30]等人的研究类似,脑电仿生治疗在 NIHSS 评分、Barthel 指数等指标显著改善,但是 Wang^[31]研究发现脑电仿生电刺激治疗脑瘫效果不佳,从机制上分析,脑电仿生电刺激可通过深感觉传入神经通道再刺激大脑皮层,扩张患者脑血管,改善血流量和血流变化,激活受损中枢功能低下的神经细胞和神经纤维,从而改善因脑细胞缺血而引致的神经功能缺损^[32]。并且脑电仿生电刺激可直接抑制缺血后脑血管炎性反应,使脑缺血损害减轻,减轻或消除失眠症状,促进脑组织平衡与日常生活功能的恢复^[33,34]。本研

究创新性的应用了脑电仿生电刺激治疗缺血性脑卒中失眠症患者,取得了一定的效果,为后期缺血性脑卒中失眠症患者的预后和治疗提供新的治疗方案,但是本研究也有一定的不足,样本数量较少,且没有进行随访分析,导致远期效果可能存在研究偏倚,将在后续研究中深入分析。

综上所述,脑电仿生电刺激在缺血性脑卒中失眠症患者中的应用能改善睡眠质量,提高恢复平衡与日常生活功能,改善脑血流速度,从而提高治疗效果。

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