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神经肌肉关节促进训练对脑性瘫痪患儿智力及肢体功能的影响 *

王淑慧[1] 高雪婷[1] 周银月[1] 肖 琳[1] 刘婷婷[2]
（西北妇女儿童医院 1 儿童保健科;2 儿内五科 陕西 西安 710061）

摘要 目的:探讨神经肌肉关节促进训练对脑性瘫痪(cerebral palsy,CP,脑瘫)患儿智力及肢体功能的影响。**方法:**2016 年 12 月到 2018 年 12 月选择在本院儿保科门诊就诊的脑瘫患儿 134 例,根据治疗方法分为观察组与对照组,各 67 例。对照组给予常规康复训练,观察组在对照组给予神经肌肉关节促进训练,两组康复观察 3 个月,记录智力及肢体功能变化情况。**结果:**观察组的总有效率为 98.5 %,高于对照组的 83.6 %(P<0.05)。两组康复后的粗大运动功能测试量表(gross motor function measure, GMFM)评分都高于康复前(P<0.05),观察组高于对照组(P<0.05)。两组康复后的适应与语言行为评分都高于康复前(P<0.05),观察组也高于对照组(P<0.05)。两组康复后的 F 波振幅高于康复前(P<0.05),阈值低于康复前(P<0.05),康复后观察组与对照组对比差异也都有统计学意义(P<0.05)。**结论:**神经肌肉关节促进训练在脑瘫患儿的应用能促进改善智力及肢体功能,重建患儿的肌电功能,从而提高治疗效果。

关键词:神经肌肉关节促进训练;脑性瘫痪;智力;肢体功能;F 波
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Effects of Neuromuscular Joint Promotion Training on Intelligence and Limb Function of Children with Cerebral Palsy*

WANG Shu-hui[1], GAO Xue-ting[1], ZHOU Yin-yue[1], XIAO Lin[1], LIU Ting-ting[2]
(1 Department of Child Health; 2 Departments of Pediatric Internal Medicine, Northwest Women's and Children's Hospital, Xi'an, Shaanxi, 710061, China)

ABSTRACT Objective: To investigate the effect of neuromuscular joint promotion training on the intelligence and limb function of children with cerebral palsy (CP, cerebral palsy). **Methods:** From December 2016 to December 2018, 134 cases of children with cerebral palsy who were treated in the outpatient department of the Pediatric Care Department of our hospital were selected as. All the cases were divided into the observation group and control group with 67 cases each groups accorded to the treatment. The control group were given regular rehabilitation training, and the observation group were given neuromuscular joint promotion training in the control group. The two groups were observed for 3 months of rehabilitation, and the changes in intelligence and limb function were recorded. **Results:** The total effective rates of the observation group were 98.5 %, which were higher than 83.6 % of the control group (P<0.05). The GMFM scores of the two groups after rehabilitation were higher than those before recovery (P<0.05), and the observation group were higher than the control group (P<0.05). The adaptation and language behavior scores of the two groups after rehabilitation were higher than those before rehabilitation (P<0.05), and the observation group were also higher than the control group(P<0.05). The F wave amplitude of the two groups after rehabilitation were higher than that before rehabilitation (P<0.05), and the threshold were lower than before rehabilitation (P<0.05), the difference compared between the observation group and the control group after rehabilitation were also statistically significant (P<0.05). **Conclusion:** The application of neuromuscular joint promotion training in children with cerebral palsy can improve the intelligence and limb function, rebuild the children's electromyographic function, and improve the therapeutic effect.

Key words: Neuromuscular joint promotion training; Cerebral palsy; Intelligence; Limb function; F wave
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前言

脑性瘫痪(cerebral palsy,CP)简称脑瘫,多是婴幼儿期出现的神经障碍性疾病,为脑部非进行性损伤所导致的运动和姿势发育异常综合征[1]。该病在婴幼儿的患病率为千分之一左右,其中多数为偏瘫型脑瘫[2,3]。脑性瘫痪婴幼儿在临床上表现为运动和姿势异常,可伴随有中枢性运动障碍及姿势异常,同时经常伴智力低下等,早期若不能有效治疗,继发患侧肢体关节肌肉

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作者简介:王淑慧(1986-),女,硕士,住院医师,研究方向:儿童运动发育迟缓的早期康复干预治疗,
电话:18192288008,E-mail:ihaveakitty@163.com
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挛缩变,严重影响小儿自身与家庭的生活质量[4]。病理学研究显示脑损伤和中枢神经系统的发育障碍主要累及小脑、锥体系、锥体外系等组织,从而导致随意运动的障碍,临床可表现为单瘫、双瘫、偏瘫、四肢瘫等[5,6]。脑瘫的康复在于早期持久的纠正异常的姿势和肢体的功能训练等,传统方法包括物理疗法、悬吊训练、作业疗法、推拿等,虽然有一定的疗效,但是很难持续改善患儿的症状[7-9]。神经肌肉关节促进训练为是一种无创性的治疗手段,可针对每个患儿选择不同的训练方法,进而影响脑部神经功能[10,11]。本文具体探讨了神经肌肉关节促进训练对脑性瘫痪患儿智力及肢体功能的影响,希望为临床治疗该病提供一个简单、有效的治疗方案。现总结报道。

1 资料与方法

1.1 研究对象

2016 年 12 月到 2018 年 12 月选择在本院儿保科门诊就诊的脑瘫患儿 134 例作为研究对象,纳入标准:符合脑瘫患儿的诊断标准;患儿家属知情并同意参与者;年龄 1~3 岁;粗大运动功能分级Ⅰ~Ⅲ级;心脏、肝脏、肾脏功能正常;认知功能正常;右利手患儿。排除标准:显著遗传基因异常者;既往有脑病史,有记忆和认知障碍的患儿;合并有心、肺、肾和造血系统严重原发疾病患儿;母孕期或出生后曾使用氨基糖甙类药物者。

根据治疗方法分为观察组与对照组各 67 例,两组患儿的一般资料对比无差异(P>0.05),见表 1。

表 1 两组一般资料对比

Table 1 Comparison of two general data

Groups	n	Gender (M/F)	Age (years)	Height (cm)	Weight (kg)	Type of disease (spastic / involuntary motor / hypotonia / ataxia)
Observation group	67	34/33	2.45± 0.33	92.11± 2.47	17.10± 2.44	37/13/12/5
Control group	67	35/32	2.39± 0.42	91.87± 3.11	17.89± 1.29	38/12/10/7

1.2 康复方法

对照组:给予常规康复训练,包括感觉统合训练、推拿、物理治疗、功能训练、作业治疗等,每项每天 1 次,治疗观察 3 个月。

观察组:在对照组给予神经肌肉关节促进训练,具体措施如下:(1)训练原则:由易到难,由卧位到坐位或立位,由被动到主动。(2)治疗方法:a:站立训练、重心转移训练、转移训练及步态训练。b:通过反复的输入正确的运动模式使患儿再学习运动技能,建立正确的运动模式,激活核心肌群。c:通过慢牵张法手法牵伸踝关节,加强胫骨前肌、腓骨长短肌力量,促进踝关节背伸,加强患者的主动踝背伸和足外翻动作,加强外翻肌群的主动力量。d:注意良肢位的摆放,患者卧位,保持髋关节伸展,避免增高下肢张力增高与痉挛模式的形成。e:每项每天 1 次,治疗观察 3 个月。

1.3 观察指标

(1)疗效标准:根据患儿发育顺序的提高程度、肌张力的改善程度、异常姿势矫正程度与智力的提高情况进行评定,治愈:发育顺序达到正常,肌张力改善,肢体运动功能对称,智力正常;显效:达到上述四项标准的三项;好转:达到上述四项标准的两项;无效:无达到上述标准,甚或恶化。治愈 + 显效 = 总有效率。(2)在康复前后进行 GMFM 评定,GMFM 属于等距量表,可以合理判断脑瘫患儿的粗大运动功能水平,分数越高,运动功能越好。(3) 所有患儿在康复前后采用盖塞尔儿童发育量表(Gesell developmental scale)进行评定,选择适应行为与语言行为两个子维度进行评定,分数越高,智力越好。(4)在康复前后采用肌电图行正中神经 F 波检测,使用 Keypoint 诱发电位仪(丹麦 BD 公司),记录 F 波振幅与阈值。

1.4 统计方法

选择 SPSS20.00,计量数据选择 $\bar{x}\pm s$ 表示[对比采用 t 检验(符合正态分布)或秩和检验(不符合正态分布];而计数数据采用频数或者百分比表示(对比为 x^2 卡方检验),检验水准为 α=0.05。

2 结果

2.1 疗效对比

观察组的总有效率为 98.5%,高于对照组的 83.6%(P<0.05),见表 2。

表 2 两组总有效率对比(例,%)

Table 2 Comparison of the total effective rate between the two groups (n, %)

Groups	n	Cure	Excellence	Improve	Invalid	Effective rate
Observation group	67	60	6	1	0	66(98.5)*
Control group	67	45	11	9	2	56(83.6)

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

2.2 GMFM 评分变化对比

两组康复后的 GMFM 评分都高于康复前(P<0.05),观察组高于对照组(P<0.05),见表 3。

2.3 智力发育评分变化对比

两组康复后的适应与语言行为评分都高于康复前(P<0.05),观察组也高于对照组(P<0.05),见表 4。

2.4 F 波振幅与阈值变化对比

两组康复后的 F 波振幅高于康复前(P<0.05),阈值低于康复前(P<0.05),康复后观察组与对照组对比差异也都有统计学意义(P<0.05),见表 5。

表 3 两组康复前后 GMFM 评分变化对比(分，$\bar{x}\pm s$)

Table 3 Comparison of changes in GMFM scores between the two groups before and after rehabilitation (scores, $\bar{x}\pm s$)

Groups	n	Pre-rehabilitation	Post-rehabilitation
Observation group	67	34.93± 4.45	67.33± 7.49#*
Control group	67	34.13± 5.43	56.98± 4.42#

Note: Compared with the control group, *P<0.05; Compared with the same group pre-rehabilitation, #P<0.05.

表 4 两组康复前后智力发育评分变化对比(分，$\bar{x}\pm s$)

Table 4 Comparison of changes in the scores of intelligence development between the two groups before and after rehabilitation (scoress, $\bar{x}\pm s$)

Groups	n	Adaptive behavior		Linguistic behavior	
		Pre-rehabilitation	Post-rehabilitation	Pre-rehabilitation	Post-rehabilitation
Observation group	67	54.20± 3.24	87.24± 4.29#*	56.30± 5.39	84.25± 3.84#*
Control group	67	53.89± 7.14	76.20± 5.11#	54.99± 5.01	77.02± 4.19#

表 5 两组康复前后 F 波振幅与阈值变化对比($\bar{x}\pm s$)

Table 5 Comparison of F wave amplitude and threshold change between the two groups before and after rehabilitation ($\bar{x}\pm s$)

Groups	n	Amplitude (mV)		Threshold(mA)	
		Pre-rehabilitation	Post-rehabilitation	Pre-rehabilitation	Post-rehabilitation
Observation group	67	0.16± 0.03	0.45± 0.07#*	66.40± 3.14	52.67± 4.42#*
Control group	67	0.17± 0.02	0.36± 0.08#	66.98± 2.19	60.29± 5.11#

3 讨论

脑瘫是导致婴幼儿运动功能障碍最常见的疾病之一，并且该病不是单一的疾病，除了运动障碍外常伴随有认知功能障碍、感知觉功能障碍、交流及行为障碍等[12]。当前我国高危儿的成活率明显提高，但脑瘫的发病率却呈逐年升高的趋势，已引起社会的广泛重视[13]。现代研究表明脑性瘫痪的病理改变主要为白质中神经纤维变化以及深部灰质团块、皮质、脑干神经核的细胞结构改变等[14,15]。目前国内外尚无治疗脑瘫的特效药物，由于脑瘫的病情复杂且多样，决定了脑瘫在治疗过程中也需要加强训练康复[16,17]。本研究显示观察组的总有效率为 98.5 %，高于对照组的 83.6 %；两组康复后的 GMFM 评分都高于康复前，观察组高于对照组。表明神经肌肉关节促进训练在脑瘫患儿的应用能改善肢体功能，提高康复效果。从机制上分析，神经肌肉关节促进训练可改善淋巴及血液循环，减轻肌肉紧张，有利于皮下水肿的消退，缓解疲劳[18,19]。并且该方法可增强关节的位置觉和运动觉，活化机体内在的止痛机制，增加了局部皮肤的血液循环，促进改善平衡功能，从而达到肢体功能改善的效果[20,21]。

现代研究表明脑瘫的直接原因是脑损伤和脑发育缺陷，包括病因主要包括母体内发育受限、神经系统发育不完善、射线暴露史、动物接触史、先兆子痫、颅内出血。脑瘫患儿除了运动障碍外，还多伴随有智力发育缺陷等[22,23]。有研究显示脑瘫可以导致患儿神经系统发育缓慢、自主动作减少等，并且由于脑部发育迟缓，部分原始反射尚存，这也就限制了脑瘫患儿的正常的生长以及发育[24]。本研究显示两组康复后的适应与语言行为评分都高于康复前，观察组也高于对照组，表明神经肌肉关节促进训练在脑性瘫痪患儿的应用能促进改善智力状况。从机制上分析，神经肌肉关节促进训练可以引起局部脑血流量及血流速度增加，有利于形成新的轴突和树突，增强发育中的大脑神经组织可塑性[25]。并且持续性的训练康复可改善组织内供血、供氧，通过神经通路传递到大脑，大脑处理后在发出指令调节局部或全身病变，有利于促进患儿智力的发育[26,27]。

肌电活动是客观反映神经功能的客观指标，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。F 波为周围神经接受超强电刺激后作出的一种后期肌肉反应，可反映肢体的功能状况[28,29]。本研究显示两组康复后的 F 波振幅高于康复前，阈值低于康复前，康复后观察组与对照组对比差异也都有统计学意义。从机制上分析，神经肌肉关节促进训练可激活损伤中枢功能低下的神经细胞和神经纤维，促进感觉和运动功能区的再组织能力，从而重建患儿的肌电功能[30,31]。本研究也有一定的不足，入研究的指标比较少，试验观察时间较短，样本数量比较少，将在后续研究中深入分析。

总之，神经肌肉关节促进训练在脑瘫患儿的应用能促进改善智力及肢体功能，重建患儿的肌电功能，从而提高治疗效果。

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