

doi: 10.13241/j.cnki.pmb.2019.13.032

感觉统合训练结合常规康复训练对痉挛型脑瘫患儿平衡控制及运动功能的影响 *

杨霞 周文智 田萍 冉莉莉 刘淑萍

(成都市妇女儿童中心医院康复科 四川 成都 610091)

摘要 目的:探讨感觉统合训练结合常规康复训练对痉挛型脑瘫患儿平衡控制及运动功能的影响。**方法:**选取2016年1月到2017年12月期间成都市妇女儿童中心医院康复科收治的痉挛型脑瘫患儿80例为研究对象,根据随机数字表法将80例患儿分为对照组(40例)和观察组(40例)。对照组患儿采用常规康复训练进行治疗,观察组患儿采用感觉统合训练结合常规康复训练进行治疗。比较两组脑瘫患儿的平衡控制功能、步态、粗大运动功能测试量表-88(GMFM-88)D区和E区的评分。**结果:**治疗3个月后两组患儿的Rivermead活动指数、Berg平衡量表得分均明显升高,且观察组患儿的Rivermead活动指数、Berg平衡量表得分高于对照组($P<0.05$)。治疗3个月后两组患儿的步行足长、步速明显增加,步宽明显减小($P<0.05$),且观察组患儿步行足长、步速大于对照组,步宽小于对照组($P<0.05$)。治疗3个月后两组患儿的GMFM-88 D区、GMFM-88 E区得分均分别明显升高($P<0.05$),且观察组患儿的GMFM-88 D区、GMFM-88 E区得分均分别高于对照组($P<0.05$)。**结论:**感觉统合训练结合常规康复训练可有效改善痉挛型脑瘫患儿的平衡控制功能、步态以及粗大运动功能。

关键词:痉挛型脑瘫;感觉统合训练;康复训练;平衡控制;步态;运动功能

中图分类号:R722; R742.3 **文献标识码:**A **文章编号:**1673-6273(2019)13-2543-04

Effect of Sensory Integration Training Combined with Routine Rehabilitation Training on Balance Control and Motor Function in Children with Spastic Cerebral Palsy*

YANG Xia, ZHOU Wen-zhi, TIAN Ping, RAN Li-li, LIU Shu-ping

(Department of Rehabilitation, Chengdu Women's and Children's Central Hospital, Chengdu, Sichuan, 610091, China)

ABSTRACT Objective: To explore the effects of sensory integration training combined with routine rehabilitation training on balance control and motor function in children with spastic cerebral palsy. **Methods:** 80 cases of children with spastic cerebral palsy who were admitted to the Department of Rehabilitation of Chengdu Women's and Children's Central Hospital from January 2016 to December 2017 were selected as subjects. 80 children were divided into control group (40 cases) and observation group (40 cases) according to the random number table method. The control group was treated with routine rehabilitation training, while the observation group was treated with sensory integration training combined with routine rehabilitation training. The scores of balance control function, gait, gross motor function test-88 (GMFM-88) D area and E area were compared between the two groups. **Results:** 3 months after treatment, the scores of Rivermead activity index and the Berg balance scale were significantly higher in two groups, and the scores of Rivermead activity index and the Berg balance scale in observation group were higher than those in control group ($P<0.05$). 3 months after treatment, the walking length, walking speed of the two groups were significantly increased, and walking width of the two groups were significantly decreased ($P<0.05$). The walking length and walking speed of the observation group were larger than those of the control group, and the walking width was smaller than that of the control group ($P<0.05$). 3 months after treatment, the scores of GMFM-88 D area and GMFM-88 E area in the two groups were significantly increased ($P<0.05$). The scores of GMFM-88 D area and GMFM-88 E area in the observation group were higher than those in the control group ($P<0.05$). **Conclusion:** Sensory integration training combined with routine rehabilitation training can effectively improve balance control function, gait and gross motor function in children with spastic cerebral palsy.

Key words: Spastic cerebral palsy; Sensory integration training; Rehabilitation training; Balance control; Gait; Motor function

Chinese Library Classification(CLC): R722; R742.3 **Document code:** A

Article ID: 1673-6273(2019)13-2543-04

前言

脑性瘫痪是发育中的胎儿或婴幼儿脑部出现的非进行性损伤所致的综合征,患儿主要表现为持续存在的活动受限、运

* 基金项目:四川省卫计委科技发展基金资助项目(2015120279)

作者简介:杨霞(1974-),女,本科,主管技师,从事康复物理治疗方法与疗效评估方面的研究,E-mail: aqmelm@163.com

(收稿日期:2018-11-09 接受日期:2018-11-30)

动及姿势发育障碍^[1,2]。痉挛型脑瘫是脑性瘫痪最常见的类型,约占脑性瘫痪的70%,以锥体系受损为主^[3]。康复训练是治疗痉挛型脑瘫患儿的重要方法,可使得患儿的粗大运动功能得到一定程度的改善,当患儿具备独立站立的能力后对平衡控制能力有了更高的要求,如何提高患儿的平衡控制能力、改善患儿的运动能力是目前临床研究的重点^[4,5]。感觉统合是指将各神经系统传导的不同感觉在脑干部分做组织统合,感觉统合训练是一种可以提供前庭、本体感觉及触觉等刺激的运动训练^[6,7],常用于治疗注意力缺陷多动障碍、智力障碍等特殊儿童^[8,9],然而关于感觉统合训练在痉挛型脑瘫患儿中的应用尚处于初级研究阶段。本研究通过随机对照研究分析了感觉统合训练结合常规康复训练对痉挛型脑瘫患儿平衡控制功能及运动功能的影响,以探讨感觉统合训练治疗痉挛型脑瘫患儿的临床疗效,为痉挛型脑瘫患儿的康复治疗提供参考,现将研究结果整理如下。

1 资料与方法

1.1 一般资料

选取2016年1月到2017年12月期间成都市妇女儿童中心医院康复科收治的痉挛型脑瘫患儿80例为研究对象,纳入标准:①所有患儿均符合《脑性瘫痪的定义、诊断标准及临床分型》中关于痉挛型脑瘫的诊断标准^[10];②年龄3-6岁;③具备扶站、独立站立和行走的能力;④具备一定理解能力,能根据指示完成动作;⑤患儿家属对本次研究知情同意,并签署同意书。排除标准:①合并视力障碍、听力障碍的患儿;②下肢接受过矫形外科手术的患儿;③入组前6个月接受过肉毒素治疗的患儿;④心、肝、肾等重要脏器存在器质性疾病的患儿;⑤患有癫痫的患儿。根据随机数字表法将80例患儿分为对照组(40例)和观察组(40例),其中对照组患儿年龄3-6岁,平均年龄(4.59±1.27)岁,男24例,女16例,类型:痉挛型双瘫22例,痉挛型偏瘫18例,粗大运动功能分级系统(Gross Motor Function Classification System, GMFCS)分级:I级8例,II级32例。观察组患儿年龄3-6岁,平均年龄(4.39±1.18)岁,男26例,女14例,类型:痉挛型双瘫21例,痉挛型偏瘫19例,GMFCS分级:I级10例,II级30例。两组患儿的一般资料比较无明显差异($P>0.05$),均衡可比。本次研究通过了我院伦理委员会的批准。

1.2 治疗方法

对照组患儿给予常规康复训练进行治疗,主要包括以下几点:①运动疗法,1次/d,40 min/次;②作业疗法,1次/d,30 min/次;③推拿,1次/d,30 min/次;④理疗,1次/d,30 min/次。每周共治疗5 d,持续治疗3个月。观察组患儿在对照组的基础上给予感觉统合训练进行治疗,主要包括以下几点:①网缆上插棍,患儿以俯卧的方式置身于网缆中,前后晃动先让患儿感受网缆的运动情况,待患儿适应后在网缆下方放一插槽,让患儿在晃动的同时将插棍插入插槽中;②滑板爬行,让患儿俯卧于滑板上,以腹部为中心、身躯紧贴滑板,同时注意抬头、挺胸、头颈部抬高,让患儿的双脚并拢抬起,爬行时双手同时着地,带动滑板移动;③蹦床跳跃,让患儿在蹦床上跳跃,跳跃过程中注意双脚并拢,对于不敢在蹦床上跳跃的患儿,开始可由家长背着患儿一起在蹦床上跳跃,待患儿克服恐惧之后再让其自行跳跃;④平衡台,让患儿在平衡台上站立,双脚分开,由医务人员

在台下缓慢摇动平衡台,使平衡台左右晃动,患儿控制身体的平衡;⑤晃动平衡木,让患儿站立在晃动平衡木上,目视前方,抬头挺胸,踏步前进;⑥大陀螺,患儿坐在大陀螺底部,双手抓住大陀螺两侧,医务人员在外帮其旋转,速度不宜过快,约2-3s一圈;⑦平衡脚踏车,双脚分别踩在车子两个脚踏板上,双手分别握紧两侧手把,身体略下蹲,同侧手脚用力向前骑行。感觉统合训练每周共治疗5 d,30 min/次,持续治疗3个月。

1.3 观察指标

1.3.1 平衡控制功能检测 在治疗前、治疗3个月后采用Rivermead活动指数和Berg平衡量表来衡量患儿的平衡控制功能,Rivermead活动指数共包括床上翻身、卧位转移、坐位平衡等15个考察项目,每个项目分为两个功能等级,其中0分代表不能完成,1分代表能完成,满分为15分,得分越高代表平衡控制功能越好。Berg平衡量表共包括从坐位站起、无支持站立、单脚站立等14个考察项目,每个项目分为五个功能等级,分别对应0-4分,满分为56分,得分越高代表平衡控制功能越好,且得分低于40分代表有摔倒的风险。

1.3.2 步态分析 在治疗前、治疗3个月后采用目测法分析患儿的步态,同时采集患儿足印,主要参数包括:步行足长(步行过程中的足印长度)、步宽(两足跟中心点之间的水平距离)、步速(步行的平均速度)。

1.3.3 粗大运动功能分析 在治疗前、治疗3个月后采用粗大运动功能测试量表-88(Gross Motor Function Measure-88, GMFM-88)评估患儿的粗大运动功能^[11],考察D、E这两个功能区,D功能区代表站立功能、E功能区代表行走与跑跳功能,每个测试项目分4个等级评分,根据患儿完成情况给予0-3分的评分,得分越高代表其粗大运动能力越强。

1.4 统计学方法

应用SPSS19.0统计学软件进行统计分析。计量资料采用均数±标准差表示,进行t检验,计数资料用百分数表示,采用卡方检验,以 $P<0.05$ 为差异有统计学意义。

2 结果

2.1 两组脑瘫患儿平衡控制功能比较

治疗前两组脑瘫患儿的Rivermead活动指数、Berg平衡量表得分比较无明显差异($P>0.05$),治疗3个月后两组脑瘫患儿的Rivermead活动指数、Berg平衡量表得分均明显升高,且观察组脑瘫患儿的Rivermead活动指数、Berg平衡量表得分高于对照组($P<0.05$),见表1。

2.2 两组脑瘫患儿步态参数比较

治疗前两组患儿的步行足长、步宽、步速比较无明显差异($P>0.05$),治疗3个月后两组患儿的步行足长、步速明显增加,步宽明显减小($P<0.05$),治疗3个月后观察组患儿步行足长、步速大于对照组,步宽小于对照组($P<0.05$),见表2。

2.3 两组脑瘫患儿粗大运动功能比较

治疗前两组患儿的GMFM-88 D区、GMFM-88 E区得分比较无明显差异($P>0.05$),治疗3个月后两组患儿的GMFM-88 D区、GMFM-88 E区得分均分别明显升高($P<0.05$),治疗3个月后观察组患儿的GMFM-88 D区、GMFM-88 E区得分均分别高于对照组($P<0.05$),见表3。

表 1 两组脑瘫患儿平衡控制功能比较($\bar{x} \pm s$)Table 1 Comparison of balance control functions in two groups of children with cerebral palsy($\bar{x} \pm s$)

Groups	n	Times	Rivermead activity index(scores)	Berg balance scale(scores)
Control group	40	Before treatment	8.21± 1.03	36.89± 4.34
		3 months after treatment	9.34± 1.06 [#]	39.87± 4.23 [#]
Observation group	40	Before treatment	8.09± 1.05	35.97± 4.21
		3 months after treatment	10.98± 1.12 ^{*#}	44.58± 4.06 ^{*#}

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

表 2 两组脑瘫患儿步态参数比较($\bar{x} \pm s$)Table 2 Comparison of gait parameters in two groups of children with cerebral palsy($\bar{x} \pm s$)

Groups	n	Times	Walking length(cm)	Walking width(cm)	Walking speed(m/s)
Control group	40	Before treatment	13.05± 1.08	14.78± 1.36	0.52± 0.08
		3 months after treatment	14.11± 1.09 [#]	13.53± 1.05 [#]	0.59± 0.07 [#]
Observation group	40	Before treatment	13.12± 1.13	14.69± 1.24	0.53± 0.06
		3 months after treatment	15.01± 1.18 ^{*#}	12.37± 1.01 ^{*#}	0.63± 0.06 ^{*#}

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

表 3 两组脑瘫患儿粗大运动功能比较($\bar{x} \pm s$)Table 3 Comparison of gross motor function in two groups of children with cerebral palsy($\bar{x} \pm s$)

Groups	n	Times	GMFM-88 D area(scores)	GMFM-88 E area(scores)
Control group	40	Before treatment	16.28± 5.48	23.15± 5.23
		3 months after treatment	22.54± 6.34 [#]	27.53± 5.64 [#]
Observation group	40	Before treatment	16.37± 5.26	23.06± 5.45
		3 months after treatment	26.71± 6.82 ^{*#}	30.62± 5.33 ^{*#}

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

3 讨论

痉挛型脑瘫是脑性瘫痪中最典型的类型,而双瘫和偏瘫是痉挛型脑瘫最常见的类型,痉挛型双瘫患儿表现为两侧肢体运动障碍,而痉挛型偏瘫患儿表现为半侧肢体运动障碍。随着近年来医学技术的高速发展,痉挛型脑瘫患儿在得到及时有效的干预和治疗后可获得最大程度的康复,早期脑的恢复能力强、可塑性大,通过康复训练能有效恢复患儿的基本运动功能,提高患儿的生活自理能力^[12-14],这对于患儿自身、患儿家庭以及社会均有重要的意义。

常规康复训练是治疗痉挛型脑瘫的重要方法,运动疗法可提高拮抗肌的收缩力、降低肌张力^[15-17],作业疗法通过有目的地筛选、设计的作业方面的活动可有效提高患儿日常生活的独立性和劳作能力^[18],推拿是中国传统康复疗法,可有效缓解痉挛、降低肌张力、改善关节活动度^[19,20],理疗通过两组低频脉冲电流刺激患儿的痉挛肌及对应的拮抗肌,可有效降低肌张力^[21,22],大部分患儿通过康复训练治疗后均可具备爬行、站立和行走的能力。感觉统合训练主要通过刺激前庭觉、本体感觉和触觉来提高大脑的感觉处理能力,进而对外界作出良好的顺应性反应^[23-25]。本研究结果显示,治疗3个月后观察组的痉挛型双瘫患儿和痉挛型偏瘫患儿的平衡控制功能、步态参数以及粗大运动功能均优于对照组同类型脑瘫患儿,这说明感觉统合训练结合常

规康复训练可有效改善痉挛型脑瘫患儿的平衡控制功能、步态以及粗大运动功能。感觉统合训练中的网缆上插棍训练可强化前庭刺激、改善全身肌肉的伸展和活化性,滑板爬行可调节前庭感觉、触觉和本体感觉,改善患儿的平衡能力,蹦床跳跃可促进前庭感觉的统合、增强平衡感,同时可训练手眼协调,平衡台、晃动平衡木训练时患儿需要站立,在站立时重心较高,平衡不易把握,通过训练可调节患儿前庭感觉、固有感觉和视觉的统合,大陀螺训练可强化患儿的前庭感觉,平衡脚踏车可加强患儿控制身体重心能力和平衡能力^[26-28]。前庭觉、本体感觉和触觉的统合对于肢体运动的形成至关重要,这三种感觉信息在脊髓、前庭核、脑干网状结构、大脑皮质、小脑等多级平衡觉神经中枢中进行整合加工,之后形成对应的运动方案,因此通过感觉统合训练来刺激前庭觉、本体感觉和触觉可以有效的改善痉挛型脑瘫患儿的粗大运动能力^[29]。刘晓莉等人的研究显示^[30],感觉统合训练可有效提高痉挛型脑瘫患儿 GMFM-66 的得分,对患儿的粗大运动功能有明显的促进作用,与本研究结果一致。

综上所述,感觉统合训练结合常规康复训练可有效改善痉挛型脑瘫患儿的平衡控制功能、步态以及粗大运动功能,然而本研究选取的病例数较少,可能会导致研究结果存在一定的偏歧,在今后的研究中应加以完善。

参考文献(References)

- [1] Unger M, Carstens JP, Fernandes N, et al. The efficacy of kinesiology

- taping for improving gross motor function in children with cerebral palsy: A systematic review[J]. *S Afr J Physiother*, 2018, 74(1): 459
- [2] 武改,鲍克秀,李之林,等.重复经颅磁刺激对痉挛型脑瘫患儿语言发育能力及运动功能的影响 [J]. *现代生物医学进展*, 2017, 17(29): 5716-5719, 5772
- [3] Anaby D, Komer-Bitensky N, Steven E, et al. Current Rehabilitation Practices for Children with Cerebral Palsy: Focus and Gaps [J]. *Phys Occup Ther Pediatr*, 2017, 37(1): 1-15
- [4] Zuurmond M, O'Banion D, Gladstone M, et al. Evaluating the impact of a community-based parent training programme for children with cerebral palsy in Ghana[J]. *PLoS One*, 2018, 13(9): e0202096
- [5] Endo Y, Mutsuzaki H, Mizukami M, et al. Long-term sustained effect of gait training using a hybrid assistive limb on gait stability via prevention of knee collapse in a patient with cerebral palsy: a case report[J]. *J Phys Ther Sci*, 2018, 30(9): 1206-1210
- [6] 宋志尚,洪跃镇,季林红,等.振动触觉感觉统合训练在偏瘫治疗中的有效性验证[J].*中国康复医学杂志*, 2017, 32(8): 928-932
- [7] Jang SH, Lee JH. Impact of sensory integration training on balance among stroke patients:sensory integrationtraining on balance among stroke patients[J].*Open Med (Wars)*, 2016, 11(1): 330-335
- [8] 蒋黎艳.感觉统合训练结合语音训练治疗儿童功能性构音障碍的疗效分析[J].*中华物理医学与康复杂志*, 2018, 40(1): 55-57
- [9] Fil-Balkan A, Salci Y, Keklice H, et al. Sensorimotor integration training in Parkinson's disease[J]. *Neurosciences (Riyadh)*, 2018, 23(4):208-215
- [10] 李晓捷,唐久来,马丙祥,等.脑性瘫痪的定义、诊断标准及临床分型[J].*中华实用儿科临床杂志*, 2014, 29(19): 1520-1520
- [11] Alotaibi M, Long T, Kennedy E, et al. The efficacy of GMFM-88 and GMFM-66 to detect changes in gross motor function in children with cerebral palsy (CP): a literature review[J]. *Disabil Rehabil*, 2014, 36(8): 617-27
- [12] Owen T, Adegboye D, Gimeno H, et al. Stable cognitive functioning with improved perceptual reasoning in children with dyskinetic cerebral palsy and other secondary dystonias after deep brain stimulation[J]. *Eur J Paediatr Neurol*, 2017, 21(1): 193-201
- [13] Simon-Martinez C, Mailleux L, Ortibus E, et al. Combining constraint-induced movement therapy and action-observation training in children with unilateral cerebral palsy:a randomized controlled trial [J]. *BMC Pediatr*, 2018, 18(1): 250
- [14] Bayón C, Martín-Lorenzo T, Moral-Saiz B. A robot-based gait training therapy for pediatric population with cerebral palsy: goal setting, proposal and preliminary clinical implementation [J]. *J Neuroeng Rehabil*, 2018, 15(1): 69
- [15] Bortone I, Leonardis D, Mastronicola N, et al. Wearable Haptics and Immersive Virtual Reality Rehabilitation Training in Children With Neuromotor Impairments [J]. *IEEE Trans Neural Syst Rehabil Eng*, 2018, 26(7): 1469-1478
- [16] Kim DH, An DH, Yoo WG. Effects of live and video form action observation training on upper limb function in children with hemiparetic cerebral palsy[J]. *Technol Health Care*, 2018, 26(3): 437-443
- [17] Toovey R, Bernie C, Harvey AR, et al. Task-specific gross motor skills training for ambulant school-aged children with cerebral palsy:a systematic review[J]. *BMJ Paediatr Open*, 2017, 1(1): e000078
- [18] Almasri NA, Saleh M, Abu-Dahab S, et al. Functional profiles of children with cerebral palsy in Jordan based on the association between gross motor function and manual ability [J]. *BMC Pediatr*, 2018, 8(1): 27
- [19] 谢芳,李颖.针灸推拿治疗小儿脑瘫效果观察[J].*陕西中医*, 2017, 38(1): 114-115
- [20] 王丹,钟清玲,汤小敏,等.针刺推拿疗法对学龄期脑性瘫痪儿童平衡功能及害怕跌倒的影响 [J]. *中国康复医学杂志*, 2017, 32(4): 440-442
- [21] Moreau NG, Bodkin AW, Bjornson K, et al. Effectiveness of Rehabilitation Interventions to Improve Gait Speed in Children With Cerebral Palsy: Systematic Review and Meta-analysis [J]. *Phys Ther*, 2016, 96(12): 1938-1954
- [22] Ko MS, Sim YJ, Kim DH, et al. Effects of Three Weeks of Whole-Body Vibration Training on Joint-Position Sense, Balance, and Gait in Children with Cerebral Palsy: A Randomized Controlled Study[J]. *Physiother Can*, 2016, 68(2): 99-105
- [23] Lawrence H, Hills S, Kline N, et al. Effectiveness of Exercise on Functional Mobility in Adults with Cerebral Palsy: A Systematic Review[J]. *Physiother Can*, 2016, 68(4): 398-407
- [24] Yabumoto T, Shin S, Watanabe T, et al. Whole-body vibration training improves the walking ability of a moderately impaired child with cerebral palsy:a case study [J]. *J Phys Ther Sci*, 2015, 27(9): 3023-3025
- [25] Takahashi K, Mutsuzaki H, Mataka Y, et al. Safety and immediate effect of gait training using a Hybrid Assistive Limb in patients with cerebral palsy[J]. *J Phys Ther Sci*, 2018, 30(8): 1009-1013
- [26] Jung SH, Song SH, Kim SD, et al. Does virtual reality training using the Xbox Kinect have a positive effect on physical functioning in children with spastic cerebral palsy A case series[J]. *J Pediatr Rehabil Med*, 2018, 11(2): 95-101
- [27] 张亚男,陈伟,巩尊科,等.感觉统合训练对高危儿粗大运动功能发育的影响[J].*中国康复*, 2017, 32(5): 355-357
- [28] 吴玉丽,赵晓莉,王游,等.感觉统合训练对脑损伤患儿神经功能恢复及发育的影响[J].*西南国防医药*, 2016, 26(12): 1471-1473
- [29] Gandolfi M, Munari D, Geroi, et al. Sensory integration balance training in patients with multiple sclerosis: A randomized,controlled trial[J]. *Mult Scler*, 2015, 21(11): 1453-1462
- [30] 刘晓莉,贾飞勇,姜慧轶,等.感觉统合训练对痉挛型脑瘫患儿粗大运动功能的影响[J].*中华临床医师杂志(电子版)*, 2013, (13): 6161-6162