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在线全文

动静互补平衡论功能锻炼结合阶梯性康复训练利于全髋关节置换者术后髋关节功能恢复*

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【摘要】 目的 分析动静互补平衡论的功能锻炼结合阶梯性康复训练在全髋关节置换（total hip replacement, THR）患者术后髋关节功能恢复的应用价值。**方法** 回顾性收集2022年6月–2023年6月收治的118例THR患者临床资料，其中57例围术期给予阶梯性康复训练（对照组），61例围术期行动静互补平衡论功能锻炼结合阶梯性康复训练（联合组）。记录两组术后恢复情况及术后并发症发生情况，在围术期评估两组患者疼痛〔视觉模拟评分法（visual analogue scale, VAS）〕及自我效能感〔康复自我效能感量表（Self-Efficacy for Rehabilitation Outcome Scale, SER）〕，比较两组术后2周、4周、8周髋关节功能。**结果** 主要结局指标：联合组术后住院时间为（7.63±1.36）d，低于对照组的（8.22±1.48）d，差异有统计学意义（t=2.257，P=0.026）。次要结局指标：两组术后并发症发生率比较（4.92% vs. 14.04%），差异无统计学意义（P>0.05）。两组围术期VAS评分经重复测量方差检验显示具有交互效应（P<0.05），两组术后VAS评分均较术前降低（P<0.05），且随术后时间的延长逐渐降低（P<0.05），联合组术后7 d及14 d VAS评分低于对照组（P<0.05）。术后14 d，两组应对及任务维度SER评分及其总分均较术后3 d升高（P<0.05），联合组高于对照组（P<0.05）。两组术后畸形、疼痛、功能、关节活动度维度Harris髋关节功能评分及其总分经重复测量方差检验显示具有交互效应（P<0.05），两组Harris髋关节功能各维度评分及其总分均随术后时间的延长逐渐升高（P<0.05），联合组术后4周及8周评分均高于对照组（P<0.05）。**结论** 动静互补平衡论的功能锻炼结合阶梯性康复训练在提高THR患者自我效能感、缓解术后疼痛、减少住院时间和改善患者髋关节功能方面，比单纯进行阶梯性康复训练更具优势。

【关键词】 全髋关节置换术 康复 动静互补平衡论 髋关节功能 自我效能感

Dynamic and Static Complementary Balance Theory-Based Functional Exercise Combined With Stepwise Rehabilitation Training Improves Postoperative Hip Function Recovery in Patients Undergoing Total Hip Replacement

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【Abstract】 Objective To analyze the application value of dynamic and static complementary balance theory-based functional exercise combined with stepwise rehabilitation training in postoperative hip function recovery in patients undergoing total hip replacement (THR). **Methods** The clinical data of 118 inpatients undergoing THR between June 2022 and June 2023 were retrospectively collected. Among the patients, 57 were given perioperative stepwise rehabilitation training (the control group), and 61 were given a combination of functional exercise based on static and dynamic complementary balance theory and stepwise rehabilitation training during the perioperative period (the combination group). The postoperative recovery status and the incidence of postoperative complications in the two groups were recorded. During postoperative recovery, the patients were assessed for pain with the visual analogue scale (VAS) and for self-efficacy with the Self-Efficacy for Rehabilitation Outcome Scale (SER). Hip function was measured and compared between the two groups at 2 weeks, 4 weeks and 8 weeks after surgery. **Results** With regard to the primary outcome indicator, the postoperative length-of-stay was (7.63±1.36) d in the combination group, which was shorter than the (8.22±1.48) d in the control group, and the difference was statistically significant (t=2.257, P=0.026). As for the secondary outcome indicators, no statistically significant difference was observed in the incidence of postoperative complications between the two groups (4.92% vs. 14.04%) (P>0.05). The perioperative VAS scores in the two groups showed an interaction effect according to the repeated measurement variance test (P<0.05). The postoperative VAS scores in both groups declined significantly compared to the preoperative scores (P<0.05), and the VAS score decreased gradually over time after surgery (P<0.05). The VAS scores in the combination group at 7 and 14 days after surgery were lower than

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those in the control group (P<0.05). At 14 days after surgery, the scores for the coping and the task dimensions and the total score of SER increased in both groups compared with those at 3 days after surgery (P<0.05), with the combination group showing higher scores than the control group did (P<0.05). After surgery, the scores for the dimensions of deformity, pain, function, and joint mobility and the total score of the Harris Hip Scale revealed interaction effects in the two groups according to the repeated measurement variance test (P<0.05), with these scores increasing gradually over time after surgery (P<0.05), and the scores in the combination group were higher at 4 and 8 weeks after surgery compared to those in the control group (P<0.05). **Conclusion** The combination of functional exercise based on dynamic and static complementary balance theory and stepwise rehabilitation training shows an advantage over stepwise rehabilitation training alone in enhancing the self-efficacy of THR patients, relieving the postoperative pain, shortening the length-of-stay, and improving the hip function in patients.

【Key words】 Total hip replacement　Rehabilitation　Dynamic and static complementary balance theory　Hip function　Self-efficacy

全髋关节置换术(total hip replacement, THR)是骨科常见手术, 我国每年人工关节置换术中有60%为THR, THR可缓解各类髋关节疾病的疼痛及功能障碍[1]。阶梯性康复训练是THR术后常用康复方式, 以术后时间及恢复情况为基准, 予以循序渐进、逐渐增强的康复训练, 可逐步改善髋关节功能, 但患者仍可出现肌力降低、慢性疼痛、关节僵硬等问题, 如何改善THR康复效果是近年临床关注的焦点[2-3]。动静互补平衡论属于平乐正骨理论体系, 要求形体与心神互补, 强调在骨科治疗及康复时动静结合, 其中“动”为肢体功能锻炼、运气、调息, “静”则包含患肢制动、静心调养、心神宁静[4]。有学者将该理论结合常规康复干预用于全膝关节置换术患者, 取得良好应用效果[5]。基于此, 本研究将动静互补平衡论与阶梯性康复训练结合, 以期改善THR的康复效果, 提升患者术后髋关节功能, 报道如下。

1　资料与方法

1.1　研究对象

回顾性收集2022年6月–2023年6月武汉市第四医院收治的118例THR患者临床资料。纳入标准: 因新鲜股骨颈骨折行择期THR治疗; 首次行THR治疗; 年龄为18 ~ 75岁; 骨折前无肢体功能障碍; 术后意识清醒、认知功能正常; 实验室检查、量表评估等资料完整。排除标准: 多发伤; 合并病理性骨折、其他部位骨折等其他骨科疾病; 合并类风湿关节炎等风湿免疫疾病; 合并凝血功能异常、血液系统疾病或恶性肿瘤; 合并心、肺、肾等重要脏器功能不全; 精神分裂症等精神疾病患病史; 术后8周内死亡或关节脱位二次手术; 依从性差, 不配合康复训练。118例THR患者中57例围术期给予阶梯性康复训练(对照组), 61例围术期行动静互补平衡论功能锻炼结合阶梯性康复训练(联合组)。本研究经武汉市第四医院伦理委员会审核批准, 所有受试者均知情同意。

1.2　方法

两组THR患者均在全麻下行改良后外侧入路THR手术, 假体均使用聚乙烯生物型假体, 术后10 h给予低分子肝素预防下肢静脉血栓。对照组THR患者围术期给予阶梯性康复训练: ①术前: 指导患者行踝泵训练、股四头肌等长收缩训练, 15 ~ 30组/次, 3 ~ 5次/d; ②术后6 h ~ 3 d: 行踝泵训练、股四头肌等长收缩训练、足跟滑动至45°及髋关节屈曲训练, 15 ~ 30组/次, 3 ~ 5次/d; ③术后4 ~ 7 d: 在术后1 ~ 3 d训练的基础上增加坐站位适应性训练及不负重行走训练; ④术后8 ~ 14 d: 在术后4 ~ 7 d的基础上增加部分负重行走训练, 利用扶拐行走时使髋关节负重为身体质量的30% ~ 50%, 15 ~ 30 min/次, 避免过度劳累, 每日康复治疗结束后均冰敷患肢10 ~ 15 min, 减轻肿胀。联合组围术期行动静互补平衡论功能锻炼结合阶梯性康复训练[5]: ①术前: 以“静”功能锻炼为主, 患肢制动, 放置功能位, 对局部行捏拿理筋疗法缓解肌肉紧张, 并行渐进式肌肉放松引导训练, 使全身放松, 缓解肌肉及精神紧张; 并辅以“动”功能锻炼, 在呼吸调整训练的同时, 行踝泵训练、股四头肌等长收缩训练, 5 ~ 10组/次, 2 ~ 3次/d, 及全身肌肉放松训练, 在保持呼吸节律的基础上逐一行颈部、上肢、腰背部、臀、双下肢股四头肌、踝泵的收紧、放松训练, 以患者可以做的最大限度为宜, 坚持5 ~ 10 s后回正, 2 ~ 3组/次, 2 ~ 3次/d。②术后以“动”功能锻炼为主, “静”功能锻炼为辅, 其中每日“静”功能锻炼同术前; “动”功能锻炼包含全身肌肉放松训练, 及以呼吸调整训练为基础的局部阶梯性训练, 术后6 h ~ 3 d: 在呼吸调整训练的同时, 行踝泵训练、股四头肌等长收缩训练、足跟滑动至45°及髋关节屈曲训练, 5 ~ 10组/次, 2 ~ 3次/d; ③术后4 ~ 7 d: 在上述训练基础上增加坐站位适应性训练及不负重行走训练, 5 ~ 10 min/次; ④术后8 ~ 14 d: 在

上述基础上增加部分负重行走训练，训练方法同对照组，5～10 min/次。

1.3 观察指标

主要疗效指标：术后恢复情况，包括术后首次排气时间、首次进食时间、首次下床时间及术后住院时间。次要疗效指标：①术后并发症：包括深静脉血栓、压力性损伤、感染、肌肉萎缩、关节僵硬等。②疼痛：在术前，术后3 d、7 d及14 d，使用视觉模拟评分法（visual analogue scale, VAS）[6]评估患者静息状态的疼痛程度，评分范围0（无疼痛）～10分（不能忍受的重度疼痛）。③自我效能感：在术后3 d及14 d，使用康复自我效能感量表（Self-Efficacy for Rehabilitation Outcome Scale, SER）[7]，量表由WALDROP等研制，中文版由王海燕等翻译随后在我国广泛使用，包含应对及任务2个维度的自我效能，各维度各包含6个条目，条目以0～10分计分，得分越高，自我效能感越强。④髋关节功能：在术后2周、4周、8周，使用Harris髋关节功能评分[8]评估，量表由HARRIS研制，包括畸形（4分）、疼痛（44分）、功能（47分）、关节活动度（5分）共4个维度，得分越高，髋关节功能越好。

1.4 统计学方法

用SPSS 24.0软件处理数据；术后恢复所需时间及VAS、SER评分等符合正态分布且方差齐性的计量数据用$\bar{x}\pm s$表示，组间多时间点比较采用重复测量方差分析，具有交互效应的指标再分别行组间及组内两两比较，组间两两比较为独立样本t检验，组内两时间点比较为配对样本t检验；深静脉血栓发生率等计数资料用例数（%）表示，用χ^2检验或Fisher精确概率法比较；α= 0.05。

2 结果

2.1 一般资料

联合组患者男性26例，女性35例；年龄55～75（63.69±8.16）岁；跌倒致伤29例，交通事故24例，高空坠落8例；患侧为左侧25例，右侧36例；受伤至手术时间3～7 d，平均（4.96±0.81）d。对照组男性27例，女性30例；年龄54～75岁，平均（62.75±8.38）岁；跌倒致伤31例，交通事故22例，高空坠落4例；患侧为左侧24例，右侧33例；受伤至手术时间3～7 d，平均（4.78±0.80）d。两组THR患者一般资料差异无统计学意义（P> 0.05）。

2.2 术后恢复情况

联合组患者术后住院时间低于对照组（P< 0.05），两组患者术后首次排气、进食、下床时间比较，差异无统计学意义（P> 0.05），见表1。

2.3 术后并发症

两组患者术后并发症发生率（4.92% vs. 14.04%），差异无统计学意义（P> 0.05），见表2。

2.4 围术期疼痛

两组患者围术期VAS评分经重复测量方差检验显示具有交互效应（P< 0.05），两组患者术后VAS评分均较术前降低（P< 0.05），且随术后时间的延长逐渐降低（P< 0.05），联合组术后7 d及14 d VAS评分低于对照组（P< 0.05），见表3。

2.5 围术期自我效能感

两组患者术后14 d应对及任务维度SER评分及其总分均较术后3 d升高（P< 0.05），联合组术后14 d应对及任务维

表1 两组患者术后恢复情况比较（$\bar{x}\pm s$）

Table 1 Comparison of postoperative recovery status between the two groups ($\bar{x}\pm s$)

Group	Postoperative first exhaust time/h	Postoperative first feeding time/h	Postoperative first ambulation time/d	Postoperative length-of-stay/d
Combination (n=61)	6.42±1.05	6.89±1.24	2.89±0.58	7.63±1.36
Control (n=57)	6.59±1.17	6.94±1.35	3.06±0.61	8.22±1.48
t	0.832	0.210	1.552	2.257
P	0.407	0.834	0.123	0.026

表2 两组患者术后并发症发生率比较

Table 2 Comparison of the incidence rates of postoperative complications between the two groups

Group	Deep vein thrombosis/case (%)	Pressure injury/case (%)	Infection/ case (%)	Muscle atrophy/case (%)	Joint stiffness/case (%)	Total/ case (%)
Combination (n=61)	0 (0.00)	1 (1.64)	0 (0.00)	1 (1.64)	1 (1.64)	3 (4.92)
Control (n=57)	1 (1.75)	2 (3.51)	1 (1.75)	2 (3.51)	2 (3.51)	8 (14.04)
χ^2	–	0.004	–	0.004	0.004	2.898
P	0.483	0.953	0.483	0.953	0.953	0.089

表 3　两组患者围术期VAS评分比较（$\bar{x}\pm s$）

Table 3　Comparison of perioperative VAS scores between the two groups ($\bar{x}\pm s$)

Group	Before surgery	3 days after surgery	7 days after surgery	14 days after surgery	*F*	*P*
Combination (*n*=61)	6.78±1.29	2.96±0.59[a]	1.89±0.59[a, b]	0.98±0.20[a, b, c]		
Control (*n*=57)	6.55±1.36	3.05±0.62[a]	2.15±0.60[a, b]	1.32±0.22[a, b, c]	$F_{interaction}$=2.986, $F_{between\text{-}group}$=2.477, $F_{time\text{-}point}$=1 101.011,	$P_{interaction}$=0.031, $P_{between\text{-}group}$=0.116, $P_{time\text{-}point}$<0.001
t	0.943	0.808	2.373	8.793		
P	0.348	0.421	0.019	<0.001		

[a] *P*<0.05, compared with before surgery; [b] *P*<0.05, compared with 3 days after surgery; [c] *P*<0.05, compared with 7 days after surgery.

度SER评分及其总分均高于对照组（*P*< 0.05），见表4。

2.6　术后髋关节功能

两组患者术后畸形、疼痛、功能、关节活动度维度Harris髋关节功能评分及其总分经重复测量方差检验显示具有交互效应（*P*< 0.05），两组Harris髋关节功能各维度评分及其总分均随术后时间的延长逐渐升高（*P*< 0.05），联合组术后4周及8周Harris髋关节功能各维度评分及其总分均高于对照组（*P*< 0.05），见表5 ~ 表7。

表 4　两组患者围术期SER评分比较（$\bar{x}\pm s$）

Table 4　Comparison of perioperative SER scores between the two groups ($\bar{x}\pm s$)

Group	Coping		Task		Total score	
	3 days after surgery	14 days after surgery	3 days after surgery	14 days after surgery	3 days after surgery	14 days after surgery
Combination (*n*=61)	41.03±4.25	47.49±3.89[a]	42.69±4.55	50.22±3.69[a]	83.72±5.89	97.71±6.67[a]
Control (*n*=57)	40.59±4.31	45.04±4.03[a]	42.01±4.37	47.45±3.95[a]	82.60±6.04	92.49±6.45[a]
t	0.558	3.360	0.827	3.939	1.020	4.288
P	0.578	0.001	0.410	<0.001	0.310	<0.001

[a] *P*<0.05, compared with 3 days after surgery.

表 5　两组患者术后Harris髋关节畸形及疼痛评分比较（$\bar{x}\pm s$）

Table 5　Comparison of postoperative scores of deformity and pain for Harris hip function scores between the two groups ($\bar{x}\pm s$)

Group	Deformity			Pain		
	2 weeks after surgery	4 weeks after surgery	8 weeks after surgery	2 weeks after surgery	4 weeks after surgery	8 weeks after surgery
Combination (*n*=61)	2.63±0.59	3.08±0.51[a, *]	3.46±0.50[a, b, *]	24.96±3.24	33.45±3.05[a, *]	37.06±2.96[a, b, *]
Control (*n*=57)	2.58±0.54	2.70±0.55[a]	3.15±0.51[a, b]	23.43±3.28	30.09±3.24[a]	34.44±3.17[a, b]
F	$F_{interaction}$=3.121, $F_{between\text{-}group}$=18.840, $F_{time\text{-}point}$=51.172,			$F_{interaction}$=4.040, $F_{between\text{-}group}$=49.001, $F_{time\text{-}point}$=390.511,		
P	$P_{interaction}$=0.045, $P_{between\text{-}group}$<0.001, $P_{time\text{-}point}$<0.001			$P_{interaction}$=0.018, $P_{between\text{-}group}$<0.001, $P_{time\text{-}point}$<0.001		

[a] *P*<0.05, compared with 2 weeks after surgery; [b] *P*<0.05, compared with 4 weeks after surgery; [*] *P*<0.05, compared with control group.

表 6　两组患者术后Harris髋关节功能及关节活动度评分比较（$\bar{x}\pm s$）

Table 6　Comparison of postoperative scores of function and joint mobility for Harris hip function scores between the two groups ($\bar{x}\pm s$)

Group	Function			Joint mobility		
	2 weeks after surgery	4 weeks after surgery	8 weeks after surgery	2 weeks after surgery	4 weeks after surgery	8 weeks after surgery
Combination (*n*=61)	29.44±3.80	35.63±2.96[a, *]	40.28±2.45[a, b, *]	2.70±0.38	3.72±0.36[a, *]	4.09±0.29[a, b, *]
Control (*n*=57)	29.20±4.05	33.28±3.11[a]	36.42±2.78[a, b]	2.65±0.38	3.45±0.33[a]	3.78±0.30[a, b]
F	$F_{interaction}$=8.349, $F_{between\text{-}group}$=35.021, $F_{time\text{-}point}$=207.211,			$F_{interaction}$=4.881, $F_{between\text{-}group}$=32.950, $F_{time\text{-}point}$=421.406,		
P	$P_{interaction}$<0.001, $P_{between\text{-}group}$<0.001, $P_{time\text{-}point}$<0.001			$P_{interaction}$=0.008, $P_{between\text{-}group}$<0.001, $P_{time\text{-}point}$<0.001		

[a] *P*<0.05, compared with 2 weeks after surgery; [b] *P*<0.05, compared with 4 weeks after surgery; [*] *P*<0.05, compared with control group.

表 7 两组患者术后Harris髋关节功能评分比较（$\bar{x}\pm s$）

Table 7 Comparison of postoperative scores for Harris hip function scores between the two groups ($\bar{x}\pm s$)

Group	Total score		
	2 weeks after surgery	4 weeks after surgery	8 weeks after surgery
Combination (n=61)	59.73±6.11	75.88±5.79[a, *]	84.89±5.32[a, b, *]
Control (n=57)	57.86±5.94	69.52±5.08[a]	77.79±4.96[a, b]
F	$F_{interaction}$=7.642, $F_{between\text{-}group}$=74.740, $F_{time\text{-}point}$=493.704,		
P	$P_{interaction}$=0.001, $P_{between\text{-}group}$<0.001, $P_{time\text{-}point}$<0.001		

[a] P<0.05, compared with 2 weeks after surgery; [b] P<0.05, compared with 4 weeks after surgery; [*] P<0.05, compared with control group.

3 讨论

有效的康复治疗是THR患者术后髋关节功能恢复的关键，阶梯性康复训练是一种遵循骨折手术愈合特点的循序渐进的康复方法，在THR围术期常用，对促进患者关节功能恢复、提升生活质量均有利[9]。但THR的康复训练仍有很大提升空间，出院后的康复训练易受多种因素干扰，部分患者出院后康复训练意愿不强，达不到预期康复效果[10]。动静互补平衡论强调形体与心神层面的静、动结合，即形体上的患肢制动及功能锻炼，及心神上的调神、调息，促进肢体及全身整体状况的共同恢复[4]。虽然近年有报道称该理论用于THR等关节置换术围术期效果较好，但相关报道较少，并未在临床广泛应用。本研究将动静互补平衡论与THR常用的阶梯性康复训练结合，对其应用价值进行分析比较，为该理论的临床应用提供可靠数据。

本研究结果显示，联合组术后14 d应对及任务维度SER评分及其总分均高于对照组，提示结合动静互补平衡论功能锻炼能提升THR患者自我效能感，分析其原因为该理论下所有的功能锻炼均在有意识支配下完成，将意识专注于呼吸及运动，与“正念训练”理论不谋而合，结合放松引导训练，使心神宁静，这种有意识的内向性锻炼，调节神经系统，促进自身修复，使患者对康复训练持有肯定、乐观的态度，而显著提升其自我效能感[11]。另有报道指出[12]，自我效能感在疾病转归及疼痛缓解中发挥重要作用，自我效能感更高者可因对治疗采取积极的态度而更快转归，也对疼痛耐受性更高，主观疼痛程度下降。本研究还发现，联合组术后7 d及14 d VAS评分均低于对照组，提示结合动静互补平衡论功能锻炼还能缓解患者疼痛，可能与该理论下功能锻炼通过心神调理，使自我效能感提升，提高疼痛耐受力有关，对加速患者转归有利。不仅如此，联合组住院时间也低于对照组，也初步证实，结合动静互补平衡论功能锻炼能提升康复训练效果，加速患者转归，缩短住院时间。

另据文献报道[13-14]，运动调息能通过促进腹内压的大幅变化，刺激盆底肌收缩，盆底肌的活动可带动股二头肌、半腱肌的拉伸，提升其兴奋性，使髋关节周围肌群核心肌力提升。本研究联合组术后以“动”功能锻炼为主，每日行全身肌肉放松训练，并在呼吸调整训练的同时行局部阶梯性训练，这种运动调息可能也有利于患者髋关节功能恢复。本研究结果显示，联合组术后4周及8周Harris髋关节功能各维度评分及其总分均高于对照组，也初步证实了上述猜测，在阶梯性康复训练的基础上结合调息、调神干预，促进形神合一，不仅提升患者心理健康水平，也能增强髋关节周围肌群肌力，加速髋关节功能转归[15]。另外，联合组术后并发症发生率略低于对照组，可能与本研究总样本量仅有118例，导致结果存在偏倚有关。本文是单中心小样本回顾性研究，虽然可为临床治疗提供参考信息，但缺乏一定代表性，研究结论还需后续大样本量多中心研究的验证。

综上所述，阶梯性康复训练结合动静互补平衡论的功能锻炼在促进THR患者术后疼痛缓解、提高患者自我效能感、促进髋关节功能恢复中可能发挥良好应用价值。

* * *

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