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脑卒中后跌倒风险评估及综合干预专家共识

脑卒中后跌倒风险评估及综合干预共识专家组

[关键词] 脑卒中; 跌倒; 步态异常; 康复
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随着社会老龄化加剧,脑卒中严重威胁着老年人的健康。根据 2019 年《全球疾病负担研究》和《中国脑卒中防治报告》显示,我国脑卒中负担呈爆发式增长趋势,防治工作面临巨大挑战。跌倒是脑卒中常见的并发症之一,在脑卒中后急性期,14%~65% 的患者经历过跌倒,在出院后的 6 个月内该比例上升至 73%^[1]。脑卒中后跌倒会导致老年人恐惧行走^[2]、骨折^[3]、住院时间延长^[4]、残疾、死亡等,严重影响老年人脑卒中后的生活独立性和生活质量,给社会和家庭带来了沉重的医疗负担。中国疾控中心发布的《全国死因监测数据集》中显示跌倒是我国 65 岁以上老年人的首位伤害致死原因,占有伤害致死的 40.88%,死亡率达 67.74/10 万人。根据全国第七次人口普查数据,我国 65 岁以上老年人为 19 063.5 万,根据既往文献报道^[5]约有 30% 的 65 岁以上老年人每年至少发生 1 次跌倒

计算,估计我国每年约有 5 719 万老年人至少发生 1 次跌倒。为了对脑卒中后跌倒更具科学认识,本专家组进一步总结近年来脑卒中后跌倒的国内外研究进展,以此作为本次共识的临床参考,旨在更好促进脑卒中后跌倒的防治及规范管理。

一、脑卒中后跌倒的机制和危险因素

1. 脑卒中后神经功能障碍

根据文献报道结果显示,脑卒中后患者跌倒率是非脑卒中者的 1.5~2.1 倍^[2,6-8]。也有少量短期研究(平均随访 6 个月)报道神经功能损害较重的脑卒中后患者跌倒率不一定低于非脑卒中老年人,可能是严重的神经功能损害导致脑卒中后患者的活动能力下降,从而掩盖了跌倒风险的增加^[9]。

脑卒中后患者跌倒通常是多重因素作用的结果。脑卒中后肌肉无力或痉挛、感觉缺失、忽视、视野缺损、平衡功能障碍、注意力下降、视空间障碍均可能增加跌倒的风险^[10-12]。前循环脑卒中后患者跌倒大多是因锥体束损害导致的肌肉无力,而后

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循环脑卒中后患者则是因小脑或前庭功能不全出现眩晕、位置感和协调性损害。前循环脑卒中还会影响感觉通路出现浅感觉缺失和本体感觉障碍,导致姿势控制障碍^[13]。Ashburn 等^[14]认为下肢不稳定且上肢运动功能差的患者更容易跌倒,因为患者在接近跌落的时候无法用上肢自救。非优势半球脑卒中常伴随肢体忽视、幻觉等,使得患者缺乏对环境危险的警惕,更容易出现跌倒^[15-16]。脑卒中还会引发各种眼部和视觉问题,如视神经麻痹、视野缺损、视力下降、上睑下垂、瞳孔障碍、眼肌麻痹、复视、追踪扫视障碍、皮质盲等,导致姿势稳定性变差、跌倒发生^[17]。高级皮层功能损害特别是执行功能下降,可能导致脑卒中后患者执行运动任务过程中注意力下降、判断力受损、整合能力下降、姿势控制障碍,增加跌倒风险^[18]。

2. 脑卒中后合并症

合并情绪异常如抑郁症状^[8,19]、跌倒恐惧^[2]等的脑卒中后患者更容易跌倒,而跌倒本身也会触发情绪反应^[20]。据文献报道,蒙哥马利-奥斯伯格抑郁量表(MADRS)得分每下降 1 个标准差,脑卒中后患者发生跌倒的相对风险增加 1.5 倍^[8]。许多老年人尽管以前未发生过跌倒或骨折,但由于抑郁症状和害怕跌倒的情绪,会表现出“谨慎步态”,如轻至中度的步速减慢、步幅减短及基底增宽,使得步态变异性显著增加,反而可能导致新的跌倒,在这些老年人中可发现额叶和锥体外系功能改变^[21]。

有 Meta 分析显示体位性低血压与老年人跌倒呈显著正相关^[22]。合并糖尿病者发生跌倒的概率增加,可能与血糖控制不佳、合并视网膜病变和周围神经病变有关^[23-24]。合并房颤者可能因伴随心律失常相关血流动力学紊乱从而出现晕厥和跌倒^[25]。既往心肌梗死、肾功能不全也是跌倒风险的独立预测因子^[4]。

3. 相关药物使用

因老年人生理储备功能下降,肝肾的药物代谢功能减弱,中枢神经系统对药物的敏感性增加,尤其容易受到药物不良反应、多种药物之间相互作用的直接影响,以及多种合并症的间接影响。Lee 等^[26]认为服用 4 种或 4 种以上药物的人更容易跌倒。Alenazi 等^[19]报道服用药物数量 8.5 种可以作为反复跌倒(≥ 2 次)的预测界值,并且当每增加 1 种药物时,脑卒中后患者复发性跌倒风险增加 9%。抗胆碱能药物能选择性阻断乙酰胆碱与脑毒蕈碱受体的结合,神经科常用于治疗老年人帕金森病震颤,但当服用 1 种或多种抗胆碱能药导致药物累积时,循环中高抗胆碱能活性增强会使得中枢神经系统中乙酰胆碱传递被抑制,导致认知功能下降、步态和平衡功能受损,可能增加服用者的跌倒风险^[27-28]。抗癫痫药和抗抑郁药也会增加脑卒中后跌倒的风险,但是抑郁和癫痫都是脑卒中后常见并发症,如不及时治疗也会导致跌倒。高血压药物如利尿剂^[29]和 β 受体阻滞剂^[30]是常见的导致体位性低血压的危险因素,但是在脑卒中后的强化降压治疗中经长期随访未发现与跌倒之间的明显关系^[31-32];氨氯地平在开始治疗后短期(1 年)内观察到有增加跌倒风险的可能,目前机制尚不清楚,可能与出现下肢水肿的并发症导致老年人身体机能下降有关^[31]; α 受体阻滞剂也有增加跌倒风险的报道^[33]。抗心律失常药胺碘酮的使用会增加患者跌倒发生的风险,可能与房颤的严重程度或药物本身的神经毒性有关^[23]。口服抗凝药可能会引发颅内出血导致跌倒,但血

药浓度不足时引起房颤患者脑卒中复发也会导致跌倒, Xa 因子抑制剂相比华法林可显著减少颅内出血风险,同时预防栓塞的疗效等同于华法林^[34]。

4. 其他因素

老年人发生脑卒中和发生跌倒的风险随着年龄增长而增加,在脑卒中后患者研究中发现,有跌倒组的年龄高于无跌倒组^[35]。性别与脑卒中后跌倒的关系并不明显,部分报道没有发现性别与跌倒风险之间存在关系,也有部分报道认为男性比女性更易发生脑卒中后跌倒^[4,12]。

发生跌倒所处的环境和跌倒前的特征性动作往往能提示跌倒原因,并有助于制定适当的防跌倒策略,如与坐姿转为站姿、转身、穿越障碍物、上厕所相关的跌倒可能提示个体虚弱、平衡反应差,在户外不平坦地面上跌倒往往提示个体活跃但不虚弱^[26]。使用助行器是对于脑卒中后姿势控制受损患者有效的干预措施,但也往往提示这些患者存在严重的姿势控制障碍,如果同时合并认知功能损害以致不能合理使用辅助器具,反而会增加患者的跌倒风险^[11,36]。

二、脑卒中后跌倒风险的评估方案

目前尚无足够的文献证据支持脑卒中后患者的跌倒风险评价。由于脑卒中后患者与一般老年人群具有相似的跌倒危险因素,大多数情况下可以参考老年人群的跌倒评价方案;不同的是,脑卒中后患者发生反复跌倒的风险较一般老年人更大,因此在出现第一次跌倒事件后,应尽可能全面地完善跌倒风险评价,除了步态和平衡评估以外,还要包括家庭安全危害、药物评估、视觉评估、认知心理测试等。

脑卒中后患者跌倒后,应首先评估是否存在直接损伤和并发症。所有跌倒者应立即进行心电图检查和体位血压测量。如条件允许,立卧位血压测定应使用无创连续每搏动脉血压计进行测量,因为使用传统手动水银血压计或示波法电子血压计测量可能会错过瞬时血压下降。

步态和平衡评估在脑卒中后患者跌倒风险评价中至关重要。有经验的医师可以肉眼观察到与脑卒中相关的异常步态,如划圈步态、共济失调步态等。使用半定量量表或功能性移动测试有助于客观评价脑卒中后患者的运动功能。Mackintosh 等^[10]报道 Berg 平衡量表(BBS) < 49 分或踏步测试 < 7 步与在院跌倒次数构建的 logistic 回归模型用于预测脑卒中后跌倒发生的灵敏度为 83% 和 83%,特异度为 91% 和 86%。Ashburn 等^[14]建议采用 Rivermead 上肢功能评分 ≤ 11.5 分预测脑卒中后 1 年内跌倒发生,与在院临近跌倒次数构建的预测模型曲线下面积为 0.69,灵敏度为 60%,特异度为 70%。Persson 等^[37]报道在脑卒中患者发病 1 周时 10 米行走测试(10-MWT) ≥ 12 秒预测 1 年内跌倒发生的灵敏度为 80%、特异度为 58%,而那些无法完成 10-MWT 的脑卒中患者表现出更高的跌倒风险($OR = 6.06$, 95% CI 2.66 ~ 13.84);计时起立步行测试(TUG)、脑卒中患者姿势评估量表(SwePASS)、BBS 在识别脑卒中后 1 年内跌倒均显示出中等预测价值(灵敏度 63% ~ 82%,特异度 50% ~ 65%)。客观化的步态和平衡分析如步速减慢、步长减短^[38]、步态不对称等能更好地评估脑卒中后跌倒的风险,借助传感器、视频步

态分析能更好地实现数据定量化。人工智能技术有助于挖掘海量步态图像数据信息,精准识别异常步态个体^[39]。一般建议选用灵敏度和特异度均超过 70% 的评价方案进行临床筛查^[40]。选择两个或两个以上的工具联合预测能达到较好的准确度,不建议仅使用单个工具进行评判^[26]。

使用跌倒风险评估的工具目的是区分跌倒的高风险人群和低风险人群,最大程度地减少跌倒发生,但不建议仅依赖跌倒风险评估工具来对患者进行跌倒风险评价^[41]。目前没有标准化的多因素跌倒风险评估工具,各医疗机构基于本国指南及文献证据制定个体化评估标准。美国国立卫生与医疗保健研究院(NICE)2013 年发布的预防老年人跌倒指南^[42]中提出应包含认知和视觉损害、尿失禁问题、跌倒史、行动不便、药物、平衡和姿势评估、一般健康情况和晕厥综合征。Lee 等^[26]认为,TUG ≥ 12 秒^[43]和功能性步态评估(FGA) ≤ 22 分(总分 30 分)^[43]可作为社区老年患者的跌倒初筛工具,圣托马斯跌倒风险评估工具(STRAFIFY) ≥ 2 分^[44]、STRAFIFY 加权版 ≥ 9 分^[45]和 Hendrich II 跌倒风险模型(HERM II) ≥ 5 分^[46]则可以作为急性环境或住院病人的跌倒筛查工具,10-MWT 不能完成^[37]、BBS < 49 分^[10]和踏步测试 < 7 步^[10]结合住院期间跌倒情况可用于脑卒中患者出院后跌倒预测。

三、脑卒中后跌倒的综合干预

1. 基本原则

鉴于脑卒中后跌倒的病理生理机制及危险因素复杂,个体差异较大,因此,脑卒中后跌倒的防治基本原则是基于病因及风险评估,进行综合干预、个体化治疗。

脑卒中的二级预防是预防脑卒中再发及预防肢体功能障碍加重,降低致残率、致死率的基础措施。二级预防包括规范的抗血小板聚集和(或)抗凝药物的使用,血压、血糖、血脂的调控,戒烟、限酒、合理饮食、适量运动等生活方式的改变等。在脑卒中二级预防的基础上,还需合理药物使用、运动训练、神经调控、认知训练及心理干预等综合措施。

2. 合理药物使用

尽管目前尚无证据表明有药物可直接改善脑卒中后步态,但可通过合理用药改善患者的后遗症、合并症,减少脑卒中后不利于步态平衡的因素,是预防脑卒中后跌倒的重要干预措施之一。

根据脑卒中的不同部位可造成不同程度的后遗症。如锥体束受累可引起肌力下降,后期肌张力升高,在积极康复锻炼同时,必要时可加用巴氯芬等缓解肌张力的药物^[47]。另如血管性帕金森综合征患者由于锥体外系受累,可造成不同程度的姿势平衡异常,可加用左旋多巴等抗帕金森类药物^[48]。脑卒中合并癫痫患者应予以合理抗癫痫药物治疗,监测药物浓度,减少发作时摔倒摔伤风险。

部分患者的步态异常是由于脑卒中后认知功能或情绪障碍引起。研究表明,多奈哌齐、加兰他敏等胆碱酯酶抑制剂可改善脑卒中后认知功能^[49],合并抑郁的患者必要时可在医师指导下服用抗抑郁药物^[50],从而间接改善步态。

脑血管病合并心脏、肺部疾病患者较多,应在相应专科医师指导下,给予干预药物,改善心、肺功能,适应运动康复。此

外,合并前庭功能紊乱、听力、视力障碍者,也应及时予以药物纠正,避免头晕或感觉传入因素引起的跌倒。老年患者骨质疏松的发生率高,应予以适当评估,给予补充钙剂、维生素 D 等强化骨骼药物,减少跌倒及跌倒后骨折的发生率^[51]。

脑卒中后患者的药物治疗需定期随访相关指标,避免不良反应。例如降压药物的不适当使用可造成血压过大波动,增加跌倒风险;部分患者服用他汀类降脂药物后可出现肌酶升高、肌肉酸痛,影响步行功能。脑卒中患者往往需合并多种用药,应注意药物之间的相互作用,避免药物代谢影响药物浓度,避免不良反应叠加。如质子泵抑制剂可影响氯吡格雷等药物经细胞色素 P450 代谢,降低药物浓度,脑卒中再发风险高^[52];多种抗癫痫药物可影响华法林等抗凝药物代谢,影响药物疗效;而部分抗精神病药物具有增加癫痫发作可能,或引起锥体外系不良反应。因此,在脑卒中后患者中,合理规范、个体化用药可很大程度减少跌倒事件。

3. 运动训练

(1)肌力训练:脑卒中患者常遗留肢体肌力减退,可出现肌肉萎缩,肢体痉挛,运动单位减少,因此,脑卒中后的肌力、步态及平衡功能训练是预防跌倒的基石。常见的肌力训练包括有氧耐力训练、等速肌力、等长收缩训练和抗阻力训练。Akima 等^[53]发现,2 周等速训练后,股四头肌力容积明显增加,运动单位有所恢复。Pattern 等^[54]发现,6 周等长收缩训练可显著提高运动单位放电率。此外,肌肉训练可潜在缓解肌肉粘弹性,减轻脑卒中患者升高的肌张力^[55]。重复肌肉活化运动还有助于运动皮层的再认^[56]。如患者可耐受,强制性运动疗法(CIMT)可改善肢体功能^[57]。重复任务训练(RTT)可加强上下肢功能,增加步行距离,改善行走功能^[58]。

(2)物理因子治疗:常用于脑卒中的物理因子治疗有低频电刺激和体外冲击波等;杨云珠等^[59]研究显示,对 40 例脑卒中偏瘫患者进行神经肌肉电刺激技术治疗,在改善患侧肢体运动上有显著疗效,提高了患者生活质量。郭友华等^[60]发现低频电刺激可促进脑功能重组,可使脑卒中患者脑梗死局部和镜像区域的血流量增加,激活脑损失对侧和同侧皮质运动相关的脑区,引起兴奋性的改变,从而改善脑卒中后肢体功能障碍。体外冲击波治疗对脑卒中患者下肢痉挛有积极的作用^[61],可诱导一氧化氮(NO)形成,可能通过改善神经功能从而调节肌肉张力。

(3)平衡与步态训练:除了肌力下降引起的痉挛性偏瘫步态外,脑卒中后患者亦可由于锥体外系、前庭小脑系统或认知功能受累,出现姿势平衡异常及各种步态障碍,如慌张步态、宽基步态、额叶步态等。此类患者不一定伴有明显的肌力问题,却存在较高的跌倒风险。因此适宜的平衡与步态训练至关重要。平衡训练主要训练重心维持和重心转移,另有躯体本体感觉训练、视本体感觉训练、视觉补偿训练及前庭功能训练(包括凝视稳定训练、直立姿势控制)^[62]等增强平衡相关的感觉传入系统。研究表明,对称站立训练、坐-起训练有助于合理分布双下肢承重,维持平衡^[63]。Meta 分析结果表明,我国传统的太极训练可显著减少脑卒中患者跌倒次数^[64]。步态训练时需注意纠正异常步态,可借助三维步态解析系统评估步态并给予指导。

(4)日常生活活动训练:模拟社区环境的训练:①不同步行

姿态及姿势控制(转动头部从不同方向与医务人员交流;行走时改变方向及速度避免碰撞;②行走同时执行 2 项及以上任务,如边走边接电话、走路时传递物品等;③在不同路面,如台阶、斜坡、楼底、草地等进行平衡训练;④复杂行走技巧训练,包括环转行走、交替踏步、蹲-起后再行走、不同高度障碍物跨越训练等;⑤嘈杂拥挤环境(如医院、菜场、超市等人流量较多地方),不同路面(如狭窄过道、斜坡、楼梯、电梯等)。

(5) 机器人辅助康复训练:近年来,机器人辅助脑卒中后患者肢体功能康复受到越来越多的关注,其种类繁多,可在物理治疗的同时给予运动辅助,增强康复效能。如 ARMin 可帮助上肢功能恢复^[65], Gangtrainer、HapticWalker、Geo-System、Lokomat、ReoAmbulator、LokoHelp、Myosuit 等有助于下肢功能及步态康复^[66-69]。Cochrane Meta 分析提示机器人辅助物理治疗可更好地帮助患者独立行走^[70]。

除运动功能康复外,机器人辅助治疗还可增强患者的社会融入度,患者可通过计算机指定“游戏任务”参与训练,康复治疗的同时提高社交能力,并使用虚拟现实技术(VR)训练做饭等日常生活能力,帮助患者更好地恢复日常和社会功能^[68]。

(6) 辅助器具:建议脑卒中患者步行时穿着舒适合脚的平底鞋^[71],如有需要,在专业人员指导下选择合适的辅助器具^[72-73],如拐杖、足踝矫形器、轮椅等。佩戴度数合适的眼睛,必要时佩戴助听器,增强感觉传入维持平衡。

4. 神经调控

近年来,脑卒中后神经调控治疗辅助康复锻炼受到越来越多的关注。常见无创治疗方式包括经颅磁刺激、经颅电刺激等。其基本机制是通过诱发磁场或电场,改变局部皮层的兴奋性^[74],其靶治疗位点多位于运动区、辅助运动区等运动相关脑区,通过提高病灶侧的兴奋性和(或)抑制病灶对侧的兴奋性,同时辅以运动治疗,以提高患者的运动、平衡能力。研究表明,多次高频(如 10~20 Hz)重复经颅磁刺激可显著提高患者的步行速度,缩短 TUG 时间,降低生理耗能指数^[75-76]。采用经颅直流电刺激刺激辅助运动区后,患者的 10-MWT 和 TUG 结果均有改善^[77]。经颅直流电刺激还可联合机器人辅助康复训练,提高康复疗效^[78]。如患者存在认知、情绪障碍影响步态,亦可选取优势侧背外侧前额叶或认知相关脑区作为靶刺激位点,提高患者认知功能,从而改善步态。

5. 认知训练及心理干预

认知康复训练包括注意力、记忆力、视空间功能、交流和社会认知、执行功能、理解能力训练等^[79]。针对认知相关步态障碍患者,Liu 等^[80]发现,为期 4 周,每周 3 次,每次 30 分钟的认知(减法数列)-行走双任务训练可有效增加脑卒中后患者的步长和双任务步速。Kim 等^[81]发现,组合多种类型认知任务,进行双任务步行训练可有效改善患者的步行能力。因此,双任务步行训练^[82]为有效的训练方法,既可锻炼患者的记忆、计算能力,又可在观察-注意-判断-行走-记忆的动态过程中,提高平衡和姿势维持能力。

脑卒中后合并认知障碍及情绪障碍常见,甚至在肢体功能恢复良好的患者中仍有半数存在认知功能障碍,1/3 的患者在脑卒中后 2~3 年内会出现抑郁^[83]。认知障碍和抑郁将间接影

响行走功能的恢复,可导致老年人主观康复意愿减弱,活动减少,不利于完成相应康复锻炼,或因情绪相关注意力障碍导致跌倒风险增加。除了药物治疗外,来自专业医师、家庭和社会的心理支持^[84]非常重要,包括运动干预^[85-86]、行为治疗^[87]、脑卒中宣教^[88]、社区干预^[89]、职业治疗^[90]等,以帮助患者以积极心态完成脑卒中后康复,回归社会。

6. 康复护理及环境改造

PDCA 循环法运用到住院脑卒中跌倒管理中来,能够系统性地解决患者的健康问题,并降低跌倒发生率。PDCA 循环法主要是按照计划、实施、检查、处理 4 个阶段来对患者进行防跌倒的安全管理,从而提升其自我保健意识,并降低跌倒率。

对患者及其家属实施针对性教育。常规跌倒高危患者的专科管理包括轮椅使用、协助患者改变体位以及转运的方法。护士评估患者及其家属对医嘱的执行性和对转运技能的实际应用情况,未能掌握的继续进行教育和演示,直至掌握。定期康复评估,由医师、治疗师、护士对所有患者存在的康复问题及跌倒隐患进行交流和沟通,联合跌倒预防的专科化管理,有效降低脑卒中患者的跌倒发生率。

随访方式:搭建互动平台,追踪患者回归社区后训练状态,把控患者训练质量。出院时指导患者或陪护家属关注康复网络平台(如微信公众号、微信群等),教会患者及家属录制、上传视频、语音通话等功能;建立患者随访档案,确定微信平台回访时间;鼓励患者每日坚持打卡行走步态的拍摄,专科护士及其他小组成员与患者互动交流,答疑解惑,按时提醒及时反馈。

加强环境安全管理:①患者睡眠或卧床时竖起床两边的护栏,下床时需放下护栏,切忌翻越,床、椅子的轮均固定;②患者下床时提供轮椅或拐杖,行动时有人搀扶、陪伴;③建议患者及陪护者穿防滑鞋,尤其在地面潮湿、上厕所和洗涤时,以免滑倒。

7. 社会支持

随着我国脑血管疾病发病率的升高,家庭、医疗机构、社区的设施也应予以更多考虑。保证地面平整干燥、洗手间及浴室配置防滑垫及扶手、家中保持充足照明、设置夜灯、严格宠物管理。医疗机构内重点科室门诊及病房配置扶手、辅助器具。社区公共场所保持地面及楼梯整洁,配置无障碍设施等。

综上,脑卒中后跌倒的干预应探索多方位的综合支持:临床医师指导危险因素控制、跌倒相关损伤治疗、识别脑卒中复发征象、治疗合并症等;治疗师行物理、作业、语言治疗,帮助患者适应辅助器械,必要时行神经调控治疗;药师提供药物指导、避免药物不良反应;社工给予经济支持、联系医疗、安排用车;全科医师协助测定骨密度和钙、宣教骨折预防、鼓励戒烟等。

四、总结

脑卒中后跌倒会增加家庭和社区的医疗负担。脑卒中后跌倒有脑卒中神经功能缺损、合并症、相关药物使用等危险因素;采用多维度量表可综合评估脑卒中后跌倒的风险;在此基础上,随着各方位的共同努力、政策的完善落实和新技术的应用,对脑卒中患者进行早期、综合、个体化干预等管理措施,包括合理药物使用、运动训练、神经调控、认知训练和心理干预、社会支持等,减少跌倒患者发生,提高生活质量。

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