应用超短波治疗 COVID-19 患者需考虑的风险

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摘要 2020 年初, 新型冠状病毒疾病(COVID-19)占据了全球政府公共卫生防控最重要的位置。我国正在做出巨大的努力以应对 COVID-19 构成的公共卫生威胁, 并积极探索治疗该疾病的方法。康复同仁为此也付出了辛苦的工作, 并提议使用超短波疗法(USWD)为患者提供康复治疗。回顾了国内外相关超短波疗法的研究报道, 拟阐明将其用于干预急性期 COVID-19 患者可能潜在的风险。在管理 COVID-19 患者时, 必须首先考虑避免医务人员和患者之间的交叉感染风险; 此外, 在应用任何电疗为患者提供治疗之前, 必须评估电疗仪器输出量的可靠性和进行患者正常皮肤感觉的测试程序。由于 COVID-19 患者的心脏功能可能会受病毒影响, 必须考虑电流靠近心脏区域的风险。并通过检索已有的国内外关于 USWD 的研究发现, 在过去的 20 年中, 物理因子的可用性和使用量呈急剧下降趋势; 也没有证据表明物理因子疗法可以治疗肺部疾病。英语文献中完全没有关于 USWD 治疗肺炎的临床试验报告。尽管在中国有一些关于使用 USWD 治疗肺炎的报道, 但仍缺乏描述适当的随机化方法、详细的治疗过程以及安全防范措施程序, 或考虑对肺功能的长期影响的报道。所以, 在使用 USWD 对 COVID-19 患者进行康复治疗建议前, 需要系统化的数据收集及研究 USWD 对急性和慢性肺损伤的作用机制和安全性。

关键词 新型冠状病毒肺炎; 超短波透热; 潜在风险; 安全措施; 证据

新型冠状病毒感染肺炎(corona virus disease 2019, COVID-19)是一种新型的人畜共患冠状病毒感染疾病, 类似于严重急性呼吸综合征(severe acute respiratory syndrome, SARS)和中东呼吸综合征(Middle East respiratory syndrome, MERS)。该病毒的病理、生理机制尚不清楚, 有关其感染的证据尚待确认, 包括潜伏期、传播率、疾病发展过程和转归。中国正在通过公众教育尽最大努力地提倡积极有效的防护策略, 并努力寻找治疗这种疾病的最佳方法。各省医学专业学会与医疗和卫生机构都提供了治疗 COVID-19 的建议方案^[1-2], 国家卫生健康委员会也

及时更新针对 COVID-19 患者的康复方案^[3]。为帮助中国抗击 COVID-19 疫情, 很多医疗企业也贡献了自己的力量, 其中有企业为武汉 3 家医院捐赠了 3 台 Curapulse 970 短波透热机和 2 台 Radarmed 950+微波机^[4]。在这些信息发布的同时, 康复专业微信群中有学者提出使用超短波疗法治疗轻型、普通型、重型和危重型 COVID-19 患者的建议。“推荐方案”建议每天使用超短波疗法 15 min, 直至患者出院。但笔者认为在推荐将超短波疗法用于 COVID-19 患者的康复治疗时, 应首先强调安全操作的重要性, 提及其潜在风险, 并考虑相关临床研究的报道。

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1 电磁场热疗法

20 多年前,物理治疗师在骨骼肌肉疾病疼痛治疗中常使用电磁场的热疗法,比如短波透热疗法(short wave diathermy, SWD)和微波透热疗法(microwave diathermy, MWD)。但这些电疗法与运动组或安慰组比较,缺乏严格的科学证据支持其有效性^[5-9],加上证据的陈旧性,许多学者提出对其治疗安全性的担忧,这导致许多西方国家在物理治疗准入课程中删除了物理因子的治疗方法。尽管如此,电疗法还是被中国广泛应用于临床康复治疗。

无论采用何种电磁场疗法,所有物理治疗课程都会先强调:① 对仪器的理解,比如:磁场、波长、频率、预期效果与机制;② 适应症;③ 禁忌症;④ 检测仪器是否正常运行;⑤ 检测患者对热的感觉是否正常?⑥ 考虑预期治疗部位的具体位置(比如:前、后、左、右),需要用“交叉”(cross fire)的方法分段来治疗吗?⑦ 考虑电极的位置(electrode placement)怎样影响磁场的位置、发热的剂量。比如:如果电极不对称,电流只会集中在相对的电极位置;⑧ 假设“磁场通过心肺是安全的”,还要考虑前面的电极与后面的电极各自与胸部的距离是否一样?不一样也会影响电流偏于前或后的部位。

除了考虑操作安全性,更重要的是还要考虑临床上使用这种电疗是否有效,是否有循证的支持,如果没有,那应该设计什么研究去验证是否有效?

2 微波疗法和短波治疗

Radarmed 950+微波设备以 2 450 MHz 的频率传送 12 cm 的微波,而一些微波机器以 915 MHz 的频率传送 33 cm 的微波。微波会产生表面热量,因此不应在水肿组织上大量使用^[10]。有研究报告已经显示微波透热的使用和可行性急剧下降^[11]。20 世纪 60 年代物理治疗师常使用频率为 27.12 MHz、波长为 11 m 的短波透热疗法来治疗肌肉骨骼疼痛。Curapulse 970 就是此类 SWD 机器的典型代表。有研究显示使用 SWD 疗法进行治疗会使人体深层组织中产生温热效应,可在慢性疼痛和伤口愈合中发挥功效,但这些研究缺乏随机对照^[12]。此外,还有研究显示短波的生理效应来自热效应和非热效应^[13]。从理论上讲,SWD 抗炎作用是通过提高细胞新陈代谢的速度,增强血管舒张和增加毛细血管过滤来实现的。血流量增加被认为可增加成纤维细胞活性、胶原蛋白沉积,并促进毛细血管生长,从而促进愈

合。然而,没有证据表明长期暴露于 SWD 的肺组织和心血管系统将会发生什么样的变化。有关于短波辐射的影响和健康危害的综述指出:暴露于电磁辐射(频率范围:3~30 MHz),在某些临床情况下可能会有益处,但会引起头痛、头晕、失眠,并诱发异常的心电图改变^[14]。大鼠在 SWD 27.12 MHz 的频率下连续暴露 10 d,会表现出肾上腺结构和超微结构变化^[15]。

本研究使用“shortwave diathermy or shortwave therapy”和(AND)“chest or lung/infection/pneumonia/respiratory/chest/lung”的关键词在 PubMed 和 PEDro 数据库上检索,仅检索到 2 份相关的英文文献,其中只有 1 份可供阅读,是有关于 SWD 治疗自发性气胸的^[16]。使用相同的检索方法检索超短波“Ultrashort wave diathermy(USWD)”,仅找到 1938 年发表的 1 篇文章^[17]。当时关于短波、超短波和透热疗法的术语区分是不清晰的^[18]。1979 年《伟大的苏联百科全书》指出,超短波疗法是“使用频率范围为 30~300 MHz 的交变电磁场”。USWD 具有“抗炎、吸收性抗痉挛和镇痛作用”,但是没有提供这些作用的研究证据,并在治疗的禁忌症清单中列举了包括“恶性肿瘤、肺结核活跃期、系统性血液病、心脏供血不足、低血压和出血倾向”等。因此,现有的证据中没有确切的证据支持可用电疗干预肺部感染性疾病;使用短波与微波干预骨骼肌肉组织疼痛的证据支持也大大地减少。

尽管中国有研究支持将 USWD 应用于肺部疾病的康复治疗。但并无研究全面描述受试者的随机方法、受试者与治疗师的隐蔽方法、干预或处理效果数据的盲法;也无研究真正介绍超短波机器使用前的磁场输出可靠性的测试、患者皮肤感觉测试、描述感染部位也未提供电极在胸部上放置方法的描述。

无论什么电疗方法,只要电流在心脏附近经过都需要注意,因为其有可能会影响心脏自律性的跳动。重要的是,已经有研究显示新型冠状病毒(SARS-CoV-2)通过血管紧张素转化酶-2(ACE-2)受体感染宿主细胞,从而感染相关的肺炎;还会引起急性心肌损伤,并对心血管系统造成损害。因此,在治疗 COVID-19 患者时应特别注意心血管的保护^[19]。假如中国部分研究所报道的“USWD 疗法可以诱导纤维细胞活动”是正确的,而 COVID-19 患者通常需要较高的吸氧浓度,那么在氧气丰富的环境下,需要考虑增加肺部纤维化风险的可能性。使用 USWD

的理由似乎旨在减少炎症,如果仅仅是减少“炎症”,是否应考虑使用药物更直接。此外,使用仪器还会增加患者与医护人员的接触感染风险。

3 循证实践及其临床意义

循证实践是基于最佳实践证据的临床实践,与参与研究无关。了解干预措施无效或潜在风险的高质量研究,与表明干预措施取得积极成果的证据同样重要。在缺乏高级证据的情况下,临床医生的判断有助于临床决策,但是这些因素需要与已知或现实的假设风险以及这些风险所产生的不确定性来进行权衡。确定 USWD 疗法是否是一种安全和/或有效的 COVID-19 患者的康复治疗方法,什么是最有效的剂量和应用方案,还需要高质量的证据来支持。因此,将 USWD 应用于治疗 COVID-19 患者之前,可能应该先建立真正的随机对照试验来进行探索,而不是一种推广建议。

4 结 论

本研究建议,在有高水平证据表明 USWD 是 COVID-19 患者安全而有效的康复治疗方法之前,应重点注意其潜在的风险,慎重考虑将其广泛用于 COVID-19 患者的康复治疗。COVID-19 是一种新型的传染性疾病,本研究旨在提醒治疗师选择任何治疗方法时,应首先考虑其安全性及预期效果的证据,并希望在肺医学领域通过严格设计和控制的临床研究进行验证之后,再考虑推广使用。

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Effect of Xingnao Kaiqiao Acupuncture combined with EEG Biomimetic Electrical Stimulation on Evoked Potential of Patients with Persistent Vegetative State

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ABSTRACT Objective: To observe the effect of Xingnao Kaiqiao acupuncture combined with EEG biomimetic electrical stimulation on brainstem auditory evoked potential (BAEP) and somatosensory evoked potential (SEP) in patients with persistent vegetative state (PVS). **Methods:** A total of ninety patients with PVS treated in the PVS awareness center of Guangdong 999 Brain hospital were randomly divided into Acupuncture group, Bionic electricity group and Combined group, with thirty cases in each group. All groups were given routine treatment, including basic management, hyperbaric oxygen therapy and drug treatment etc. In addition, the Acupuncture group received Xingnao Kaiqiao acupuncture, the refreshment treatment, at which the main acupoints were Shuigou, bilateral Neiguan, bilateral Sanyinjiao, and the auxiliary acupoints were Jiquan, Chize and Weizhong acupoints, once a day, the Bionic electricity group received the treatment of EEG bionic electrical stimulation, the main electrode were placed at GB 12 and BL 10, each treatment was for a continuous 99 min followed by a rest of 30 min, followed by another 99 min, once a day, the Combined group received Xingnao Kaiqiao acupuncture combined with EEG bionic electrical stimulation, once a day. Three groups were treated continuously for thirty days. On the day before treatment and the day after treatment, the consciousness state of the three groups was assessed by the revised coma recovery scale (CRS-R), and the grades of BAEP, SEP and the changes of latency and interval of each wave on the affected side were monitored by electromyographic evoked potential. **Results:** Before treatment, there was no significant difference of the CRS-R scores, the grades of SEP and BAEP, the latency of I, V, P15, N20, P38 wave and I-V wave interval in three groups ($P > 0.05$). Compared with before treatment, the CRS-R scores after treatment were significantly higher, the grades of SEP and BAEP after treatment were significantly lower, the latency of I, V, P15, N20, P38 wave and I-V wave interval were significantly shorter, with statistically significant differences ($P < 0.05$). Compared with the Acupuncture group and the Bionic electric group after treatment, the CRS-R scores of the Combined group were higher, the grades of SEP and BAEP in the Combined group were lower, with statistically significant differences ($P < 0.05$). The latency of I, V, P15, N20, P38 wave and I-V wave interval in the Combined group after treatment were significantly shorter than those of the Acupuncture group and the Bionic electricity group, with statistically significant differences ($P < 0.05$). **Conclusion:** Xingnao Kaiqiao acupuncture combined with EEG biomimetic electrical stimulation is helpful to promote the consciousness recovery of PVS patients, improving the clinical effect of awakening, and improve SEP and BAEP in patients with persistent vegetative state.

KEY WORDS persistent vegetative state; Xingnao Kaiqiao; acupuncture; EEG biomimetic electrical stimulation; brainstem auditory evoked potential; somatosensory evoked potential

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Considerations for Use of Ultrashort Wave Therapy in Management of COVID-19 Patients

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ABSTRACT In early 2020, Corona virus disease 2019 (COVID-19) occupies the most important prevention and control position in the global governments for public health. In China, where the virus was first identified and where to date the greatest numbers of infected people are located, significant efforts are being made to address the public health threat posed by the disease, and to identify methods to treat the disease. One method being used is ultrashort wave diathermy (USWD). This paper reviews relevant aspects of this form of electromagnetic energy to elucidate its risks and any potential benefits in acute infective conditions of the lung. When managing patients with COVID-19, the hazards to staff and patients of cross contamination by equipment and the risks of unintentional viral spread must first be considered. Further, in any application of electrotherapy modality to a patient, procedures involving assessment of reliability of machine output and normal skin sensation of the patient must be ascertained. In patients with COVID-19, the risks of passing a current close to the heart must be considered. A review of evidence on the use of electrophysical agents reveals a declining trend in the availability and use of electrotherapy over the last 20 years, and a reported reduction of such content in physiotherapy entry-level curricula. There is no evidence of a clinical benefit of USWD in pulmonary disease and there are no clinical trials on USWD reported in English literature. Despite some reports on the use of USWD in China, there are a lack of reports that describe proper randomisation methods, consideration of electrode placements, and essential safety measure procedures. The long-term effect on lung function should be contemplated. In conclusion, the authors highlight the need for structured gathering of data to investigate the role of USWD on acute and chronic effect on lung lesion prior to endorsing an unconstrained application of USWD to patients with COVID-19.

KEY WORDS COVID-19; ultrashort wave diathermy; potential risk; safety measures; evidence

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