·个案报道·

1 例颅脑损伤植物状态患者残余脑功能磁共振成像(fMRI)研究

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重症颅脑损伤早期出现的意识障碍(disorders of consciousness,DOC)一般在损伤后几天至几周内恢复,如 3 个月内不能恢复则称为植物状态(vegetative state,VS),1 年内不能恢复则称为持续性植物状态(persistent vegetative state,PVS)[1]。据统计,美国植物状态患者发生率为 19/1000000,所产生的医疗费用高达数十亿美元[2]。由于 VS 患者意识仍有一定程度恢复的可能性,因此早期判断 VS 的意识恢复迹象对制订适宜的临床决策、节省医疗资源及减轻家庭负担具有重要意义。由于 VS 患者具有正常的睡眠-觉醒周期,故 VS 又称为无反应觉醒综合征(unresponsive wakefulness syndrome)[3],但患者对外界刺激和环境变化无有知觉应答反应,无法进行言语和肢体语言交流,因此临床上辨别 VS 患者意识状态非常困难;家属偶尔观察到患者一些临床表现,如家属呼唤患者名字时情绪激动、疼痛刺激时皱眉呲牙等,这些表现均无法用临床普通量表准确反映,并且部分量表对患者意识状态的误诊率高达 40%以上[4]。近年来,有研究认为功能核磁共振成像技术(functional magnetic resonance imaging,fMRI)能观察到 VS 患者残存的大脑皮质功能及对外界的应答反应,其诊断 VS 意识障碍的敏感性及特异性可达 44%~67%[5]。临床医师利用 fMRI 能准确评定 VS 患者残存脑功能情况,并针对其意识状态类型制订个体化康复治疗方案。但目前国内基于 fMRI 评定 VS 意识状态的报道甚少。本研究对 1 例正常受试者和 1 例 VS 患者进行 fMRI 扫描,发现该 VS 患者大脑皮质功能区对外界声音刺激和任务想象刺激能产生不同反应,并据此制订促醒康复方案,同时对治疗前、后 fMRI 检查结果进行比较,为 VS 促醒治疗方案制订提供参考资料。

一、临床资料

1 例男性 VS 患者(符合中华医学会急诊医学会分会制订的 VS 诊断标准[6]),52 岁,右利手,出租车司机,外伤致颅脑损伤、意识障碍、四肢瘫 45 d,格拉斯哥昏迷量表(Glasgow coma scale,GCS)评分[7]为 6 分,其中睁眼 2 分,言语 1 分,运动 3 分;Rancho Los Amigos 分级为Ⅰ级[8];头颅 CT 检测结果显示:左侧颞骨骨折伴颞、顶、枕硬膜外血肿,蛛网膜下腔出血,脑疝形成;右侧眶内壁骨质走形欠规律,考虑陈旧性骨折可能性大。既往史:入院前 45 d 行开颅手术及气管切开术;右眼外伤史 9 年,未遗留后遗症。本研究同时入选 1 例男性健康受试者,45 岁,右利手,司机;既往无颅脑损伤病史及脑血管疾病史。

二、研究方法

对上述 1 例健康受试者和 1 例 VS 患者进行脑干听觉诱发电位(brainstem auditory evoked potential,BAEP)检查,以排除听觉传导通路病变;随后对上述 2 例对象进行声音刺激和运动想象任务下 fMRI 扫描。声音刺激分为熟悉-静息声音刺激和熟悉-陌生声音刺激,运动想象任务为想象打网球。声音指令:熟悉声音由患者发病前最亲近家属完成,指令内容为呼唤患者名字,讲述发病前感兴趣事情;陌生声音由患者未接触人员完成,指令内容为一段文字;运动想象任务指令:让患者想象自己站在网球场中间,想象自己正在练习击打网球动作。对入选 VS 患者进行促醒治疗及常规康复治疗,包括康复护理(如良肢位摆放、二便护理、气切口护理等)、促醒刺激(如环境刺激、声、光、电等感觉刺激、运动训练等)、关节活动度训练、站立床训练、MOTOmed 功率车、吞咽功能电刺激、针灸治疗等。并于治疗 3 个月后再次进行 fMRI 扫描。

三、结果

本研究正常受试者及 VS 患者 BAEP 检测结果详见图 1,可见正常受试者在两侧刺激时其Ⅰ波-Ⅴ波潜伏期均在正常范围内;VS 患者左侧刺激时其Ⅰ波-Ⅴ波潜伏期分别为 2.3 ms,3.5 ms,4.5 ms,5.4 ms 及 6.1 ms,均较正常值延长,提示该患者左侧听通路轻度受损;右侧Ⅰ波-Ⅴ波潜伏期均在正常范围内。

本研究正常受试者及 VS 患者治疗前在不同刺激及任务指令下其 fMRI 结果详见图 2~4,在熟悉-静音声音刺激下,正常受试者表现为双侧颞叶及双侧枕叶功能区激活,VS 患者仅见左侧颞叶内侧岛叶附近功能区少量激活;在熟悉-陌生声音刺激下,正常受试者双侧颞叶及深部灰质核团功能区激活,VS 患者左侧颞叶及双侧枕叶部分功能区激活,这可能与患者左颞叶受损后双侧枕叶作为协同功能区激活代偿有关;在接受运动想象任务指令时,正常受试者双侧额叶、顶叶及皮质功能区激活;VS 患者右侧顶叶皮质功能区、左侧半卵圆中心功能区激活,激活范围较正常受试者明显缩小。

根据首次 fMRI 扫描结果制订 VS 患者促醒治疗方案,指导患者亲近家属给予患者声音刺激;向患者反复讲述以前感兴趣的事情或熟悉场景,将家属对患者的声音刺激内容融入到日常康复治疗中。治疗 3 个月后 VS 患者在不同刺激和任务指令下其 fMRI 结果详见图 5~7;在熟悉-静音声音刺激下,可见 VS 患者右侧额叶、双侧颞叶、右侧枕叶皮质、左侧基底节区较治疗前明显激活;在熟悉-陌生声音刺激下,可见患者左侧颞叶、右侧枕叶有部分脑组织激活,激活区域明显增大;在接受运动想象任务指令时,可见左侧顶叶部分皮质激活区域明显增大。另外治疗后 VS 患者 Glasgow 评分提高至 8 分(其中睁眼 4 分,言语 1 分,运动 3 分),患者对声音、视物出现追踪反应。

三、讨论

近年来相关文献报道,部分 VS 患者具有隐性知觉功能,只是因言语或运动功能障碍等原因无法与外界交流,临床误以为患者仍处于植物状态。判断患者是否处于植物状态在伦理学及是否给予继续医疗支持和制订治疗决策方面均具有重要意义[9-10]。目前临床常采用 Glasgow 昏迷量表等评定患者意识状态情况,但这些量表往往无法准确反映患者意识状态的细微变

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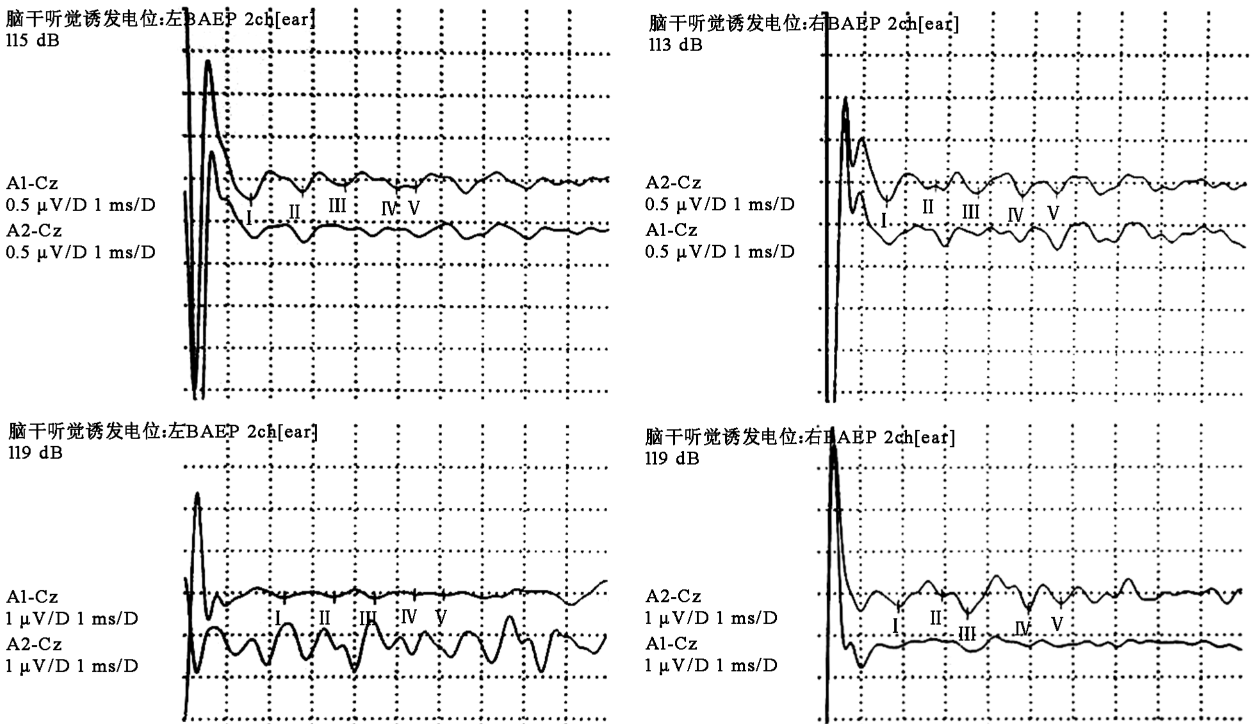
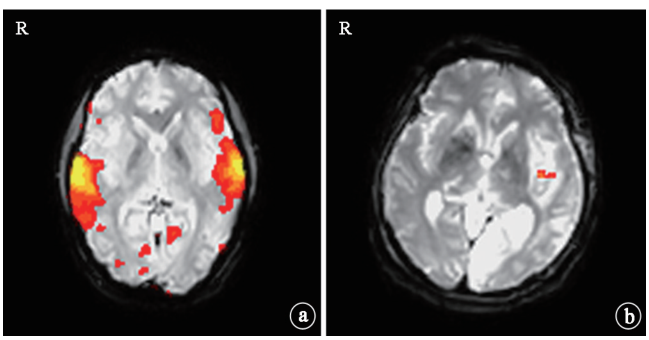
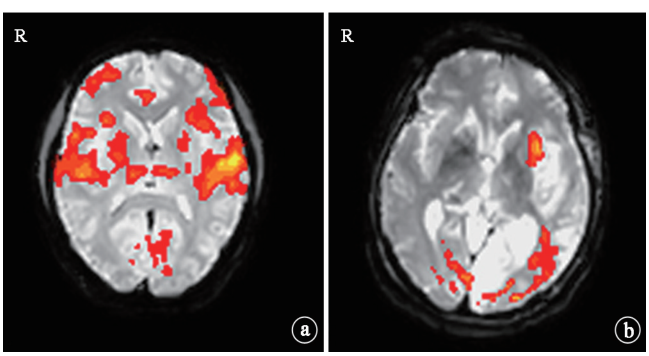


图 1　本研究正常受试者及 VS 患者 BAEP 检测结果(a 为正常人,b 为 VS 患者)



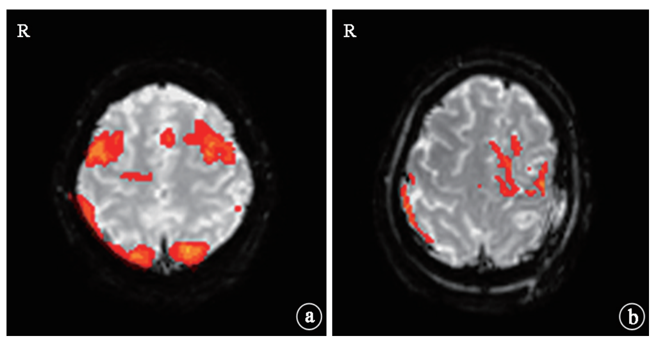
注:a 为正常受试者,b 为 VS 患者

图 2　在熟悉-静息声音刺激下正常受试者及 VS 患者 fMRI 表现



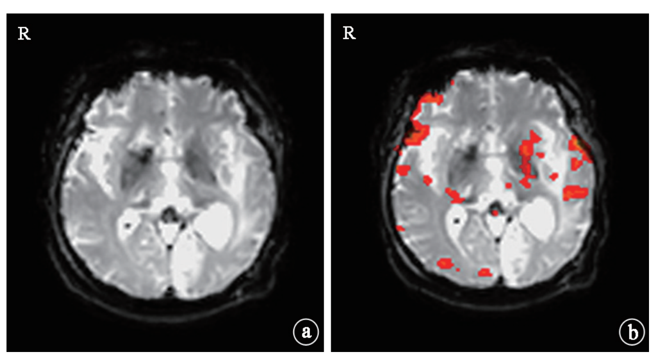
注:a 为正常受试者,b 为 VS 患者

图 3　在熟悉-陌生声音刺激下正常受试者及 VS 患者 fMRI 表现



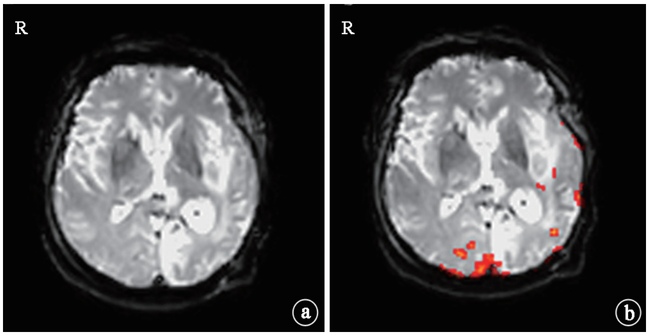
注:a 为正常受试者,b 为 VS 患者

图 4　在运动想象任务下正常受试者及 VS 患者动态 fMRI 表现



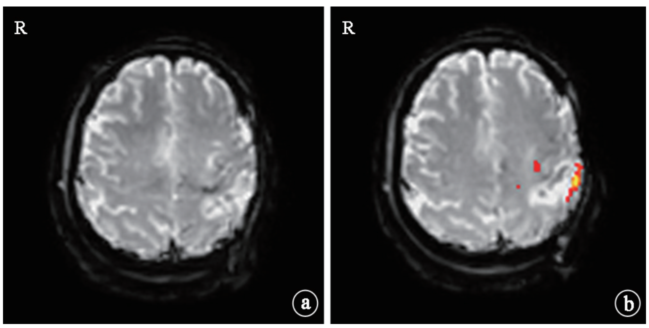
注:a 为治疗前,b 为治疗 3 个月后,图中红色区域为与治疗前相比激活增加部位

图 5　治疗前、后入选 VS 患者在熟悉-静息声音刺激下 fMRI 表现



注：a 为治疗前，b 为治疗 3 个月后，图中红色区域为与治疗前相比激活增加部位

图 6　治疗前、后入选 VS 患者在熟悉-陌生声音刺激下 fMRI 表现



注：a 为治疗前，b 为治疗 3 个月后，图中红色区域为与治疗前相比激活增加部位

图 7　治疗前、后入选 VS 患者在接受运动想象任务指令时 fMRI表现

化。fMRI 不仅可观察静息状态下大脑自发活动，而且还能通过任务指令动态观察大脑反应，从而发现残存脑功能[11-16]。Rodriguez等[17]通过图片命名任务对 10 例意识障碍患者进行fMRI观察，发现 1 例闭锁综合征患者、6 例微小意识状态(minimally conscious state, MCS)患者和 2 例 VS 患者全部或部分保留命名功能，提示 fMRI 能发现意识障碍患者隐藏的大脑功能。Bekinschtein 等[18]对 5 例 VS 患者进行运动想象任务下 fMRI 观察，给患者指令移动其左/右手，发现 2 例 VS 患者手指对侧大脑皮质功能区激活。本研究对 1 例正常受试者及 1 例 VS 患者进行声音刺激和运动想象指令下的 fMRI 检查，结果发现 VS 患者大脑被激活功能区较正常受试者明显减少。本研究虽未发现 VS 患者觉醒或知觉迹象，但其一些功能区有低水平激活(如初级听皮质中枢、部分运动皮质激活等)，表明该患者大脑不仅对听觉刺激产生一定程度反应，而且其运动皮质还残留部分功能，笔者认为通过 fMRI 可观察 VS 患者潜在的大脑皮质反应。Monti 等[19]对 54 例意识障碍患者进行观察，发现 5 例患者fMRI表现有大脑意识活动，其中 3 例患者临床量表评测提示存在知觉征象，1 例可按照指令正确回答“是或否”。Forgacs 等[20]对入选 10 例 VS 患者和 12 例 MCS 患者进行 fMRI 预后判断研究，发现在执行运动想象任务和空间游走想象任务时大脑相关功能区明显激活的 5 例 VS 患者全部进展为 MCS，而另外 5 例无激活反应的患者仍处于 VS 状态，认为 fMRI 判断 VS 预后的敏感性为 100%；相关大脑功能区激活的 9 例 MCS 患者，其中 6 例恢复了意识，无激活的 3 例 MCS 患者中有 1 例恢复意识，认为fMRI 判断 MCS 预后的敏感性为 85%。基于上述研究结果，本研究对入选 VS 患者进行 fMRI 扫描，发现该患者对声音刺激及运动想象具有一定反应，在建议患者家属坚持康复治疗同时，并与其一同制订以听觉刺激和运动想象为主的康复促醒方案，治疗 3 个月后经 fMRI 再次扫描发现，该患者对所有任务指令其相应脑功能区激活情况均明显增强，而且患者 Glasgow 评分由 6 分提高到 8 分，对声音刺激偶有眼球追踪表现。虽然不排除患者大脑自然恢复的可能，但笔者认为可应用 fMRI 指导临床制订适宜的康复治疗方案，采取更有效的促醒措施，强化 VS 患者残存的大脑功能，有利于促进 VS 意识状态恢复，为 VS 患者意识状态评定和康复治疗提供新的思路。

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· 外刊撷英 ·

Tissue flossing, jump and sprint performance

BACKGROUND AND OBJECTIVE Previous studies have demonstrated that tissue flossing can be useful in improvement of ankle range of motion and single leg jump performance. This study investigated the effect of tissue flossing at different time points following the application of the bands.

METHODS Subjects were 69, healthy, recreational athletes. The participants were randomized to either a FLOSS group or a control group (CON). Following a standardized warmup, both groups were asked to perform several athletic maneuvers, including a weight-bearing lunge test (WBLT), a counter movement jump and a 15-meter sprint test. Those in the FLOSS group had a band attached to each ankle before beginning warmup exercises, while the CON group had none.

RESULTS A significant intervention-time interaction was found for the WBLT in favor of FLOSS as compared to CON ($P<0.05$). These results were associated with trivial to small effect sizes at all time points. As compared to CON, better, but non-significant, improvement in CMJ force and sprint times were seen in the FLOSS group ($P>0.05$) at up to 45 minutes after the bands were removed.

CONCLUSION This study revealed that applying FLOSS bands to the ankle (talocrural) joint for two minutes may improve ROM, jump and sprint performance for up to 45 minutes after removing the bands.

【摘自：Driller M, Mackay K, Mills B, et al. Tissue flossing on ankle range of motion, jump and sprint performance: a follow-up study. Phys Ther Sport, 2017, 28: 29-33.】

Childhood body mass index and adult ischemic stroke

BACKGROUND AND OBJECTIVE Ischemic stroke (IS) is a major cause of death and disability worldwide. Studies investigating the association between childhood body mass index (BMI) and adult IS have produced inconsistent results. This study was designed to better understand this relationship.

METHODS Data for this study were retrieved from the Copenhagen School Health Records Register, including information for 372,636 children born from 1930 to 1989, with follow-up conducted using the National Health Registers through 2012. From records of physical examinations, BMI data were calculated. Data were included for adults at least 25 years of age at study entry, with follow-up ending on the date of a first ever IS, death or study completion on December 31, 2012.

RESULTS Of the 307,677 individuals followed, no association was found between childhood BMI and risk of IS after 55 years of age. However, an association was found between early occurring IS and BMI at ages seven to 13. Using the BMI at age 13 of 16.7-17.9 kg/m^2 as a reference, the hazard ratios (HR) for early ischemic stroke were 1.71 for females with a BMI of greater than 23.3 kg/m^2, and 1.77 for a BMI of greater than 22.5 kg/m^2 in males. In addition, an increase in BMI between ages seven and 13 was associated with an increased risk of early IS in both males and females (HR 1.10 and 1.14, respectively).

CONCLUSION This large Danish study found that childhood obesity at age 13, as well as increasing obesity between ages seven and 13, are associated with an increased risk of early ischemic stroke.

【摘自：Gjærde LK, Gamborg M, Ängquist L, et al. Association of childhood body mass index and change in body mass index with first adult ischemic stroke. JAMA Neurol. 2017, 74(11): 1312-1318.】