·论 著·

多模式神经电生理监测在面肌痉挛MVD中的应用

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【摘要】**目的** 探讨多模式神经电生理监测在面肌痉挛(HFS)显微血管减压术(MVD)中的应用效果。**方法** 回顾性分析2020年12月至2022年3月MVD治疗的80例HFS的临床资料。术中应用异常肌电反应(AMR)、面神经运动诱发电位(FMEP)及自由肌电图(EMG)监测指导手术。**结果** 术后1周治愈55例,明显缓解15例,部分缓解7例,无效3例;术后半年治愈57例,明显缓解10例,部分缓解9例,无效4例。术后1周治疗有效率为96.3%,术后半年治疗有效率为95.0%。术中AMR消失70例,存在10例;术中AMR消失病人术后1周(74.3%)、术后半年(78.6%)治愈率明显高于术中AMR存在的病人(分别为30.0%、20.0%;P<0.05)。80例术中均稳定引出FMEP,其中72例FMEP无变化;6例出现一过性波幅降低和(或)潜伏期延长,暂停手术操作后恢复;2例出现波幅降低且暂停手术操作无改善,术后出现面瘫。80例在分离和探查面神经REZ时均出现EMG不同程度的反应,其中一过性反应71例;持续出现的面神经爆发肌电图反应9例,暂停手术操作后缓解。**结论** 术中AMR+FMEP+EMG多模式电生理监测技术对MVD判断责任血管、提高治愈率、保护面神经功能及避免并发症具有重要作用。

【关键词】面肌痉挛;显微血管减压术;神经电生理监测;疗效

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Application of multimodal neuroelectrophysiological monitoring in microvascular decompression for patients with hemifacial spasm

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【**Abstract**】**Objective** To investigate the application value of multi-mode neuroelectrophysiological monitoring in microvascular decompression (MVD) for patients with hemifacial spasm (HFS). **Methods** The clinical data of 80 patients with HFS treated by MVD from December 2020 to March 2022 were retrospectively analyzed. Abnormal muscle response (AMR), facial motor evoked potential (FMEP) and electromyography (EMG) were used to guide the operation. **Results** Of these 80 patients, 55 patients were cured, 15 were significantly relieved, 7 were partially relieved, and 3 were ineffective 1 week after operation; 57 patients were cured, 10 were significantly relieved, 9 were partially relieved, and 4 were ineffective 6 months after operation. The effective rates were 96.3% and 95.0 at 1 week and 6 months after operation, respectively. Intraoperative AMR was disappeared in 70 patients, and present in 10. The cure rate at 1 week (74.3%) and 6 months (78.6%) after operation of patients with intraoperative AMR disappearance were significantly higher than those (30.0% and 20.0%, respectively) of patients with intraoperative AMR presence (P<0.05). FMEP was successfully evoked in all 80 patients, of whom 72 patients had no change in FMEP, 6 had transient amplitude reduction and/or prolonged latency which recovered after stoping the operation, 2 had amplitude reduction and no improvement after stoping the operation, and had facial paralysis after operation. EMG responses were observed in all 80 patients during the separation and exploration of the root exit zone of facial nerve, including 71 patients with transient responses and 9 with persistent facial nerve burst EMG responses which were relieved after stoping the operation. **Conclusions** During MVD for patients with HFS, intraoperative multimodal electrophysiological monitoring technique of AMR+FMEP+EMG plays an important role in judging the responsible vessels of HFS, improving the cure rate, protecting facial nerve function and avoiding complications.

【**Key words**】Hemifacial spasm; Microvascular decompression; Abnormal muscle response; Facial motor evoked potential; Electromyography

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面肌痉挛(hemifacial spasm,HFS)表现为面神经支配的一侧面部肌肉短暂性或阵发性不自主挛缩。80%~90%的HFS是面神经根部出脑干区(root exit zone,REZ)存在血管压迫产生脱髓鞘病变导致神经异常连接[1]。显微血管减压术(microvascular decompression,MVD)是治疗HFS的有效方法[2],术中神经电生理监测可指导手术操作,帮助判断手术减压效果是否充分,提高手术疗效[3]。2020年12月至2022年3月运用多模式神经电生理监测辅助MVD治疗HFS共80例,效果良好,现总结如下。

1 资料与方法

1.1 *病例选择标准* 纳入标准:单侧HFS,有强烈的手术意愿且第一次行MVD;术前3D-TOF-MRA和3D-SPACE检查排除继发性HFS,同时帮助了解责任血管的来源和走向;规律性服用卡马西平、苯妥英钠、加巴喷丁、注射A型肉毒素毒素等药物不能控制或药物带来的不良反应不能耐受如药物过敏、剥脱性皮炎、肝肾功能损害、白细胞减少、吞咽困难等。排除标准:全身有严重疾病等存在手术禁忌症;有面神经损伤病史;存在影响术中电生理监测结果的其他疾病如血液系统疾病不宜皮下穿刺、心律失常等。

1.2 *研究对象* 纳入符合标准的HFS共80例,其中男性24例,女性56例;年龄22~79岁,平均(41.5+10.8)岁;右侧36例,左侧44例。本研究方案经临沂市人民医院伦理委员会审查批准(批号为:科技伦审第(202402-H-025)号),病人均签署知情同意书。

1.3 *麻醉和手术方法* 经口插管全身麻醉后连接监测系统,插管前应用短效肌松药,术中不用或少用肌松剂,避免影响肌电反应。取健侧卧位,在横窦下方、紧贴乙状窦后方处开颅,切开硬膜后悬吊,剪开蛛网膜,观察桥小脑角区面听神经与周围血管的解剖关系。首先暴露舌咽神经和面神经间隙,充分显露面神经根部REZ,根据术前影像检查明确责任血管后充分松解游离,将大小合适的Teflon垫棉置于责任血管与面神经之间,反复确认没有血管压迫后,缝合硬脑膜,常规关颅。

术中监测异常肌电反应(abnormal muscle response,AMR)、面神经运动诱发电位(facial motor evoked potential,FMEP)、肌电图(electromyography,EMG)。①术中全程监测AMR,并在打开硬脑膜、释放小脑延髓池脑脊液、分离和松解责任血管等关键步骤重点监测,观察垫入Teflon棉片和缝合硬脑膜时AMR,其中口轮匝肌和颏肌AMR均消失记录为AMR消失,口轮匝肌和颏肌AMR单个未消失或均未消失记录为AMR存在。②以潜伏期>12 ms作为FMEP有效的波形,打开硬脑膜前建立基线,手术关键步骤,如分离和松解责任血管、垫入Teflon棉片时反复记录FMEP,若FMEP出现波幅下降和潜伏期延长,立即提醒术者暂停手术并查找原因,避免手术操作对面神经及其滋养动脉造成损伤。③术中EMG持续记录颏肌、眼轮匝肌和口轮匝肌的静息电活动,参考电极位于相应肌腱。若出现高频爆发电活动,则认为报警,并利用术中探针刺激出现肌电爆发以确认损伤的神经组织,及时提醒术者暂停手术操作,避免损伤操作区的神经。

1.4 *疗效评估* 术后1周、术后半年评估疗效[4]:治愈,症状完全消失;明显缓解,症状基本消失,只是在情绪紧张激动时,或特定面部动作时才偶尔诱发出现;部分缓解,症状减轻,但发作仍比较频繁;无效,症状没有变化,甚至加重。治愈、明显缓解及部分缓解为治疗有效。

1.5 *统计学分析* 采用SPSS 22.0软件处理;正态分布计量资料用$\bar{x}\pm s$表示,采用t检验;计数资料采用χ^2检验;以$P<0.05$为差异有统计学意义。

2 结 果

2.1 *手术情况* 术中发现责任血管:小脑后下动脉及其分支17例(21.25%),小脑前下动脉54例(67.5%),椎-基底动脉3例(3.75%),无名动脉1例(1.25%),小脑前下动脉+小脑后下动脉4例(5%),小脑前下动脉+右侧椎动脉1例(1.25%)。80例均顺利完成手术,无手术死亡病例。术后发生一过性面瘫2例,一过性听力下降1例,一过性吞咽困难、声音嘶哑1例,一过性精神障碍1例。

2.2 *术中AMR波形变化和术后疗效* 术中AMR消失70例,其中术后1周治愈52例(74.3%),明显缓解12例,部分缓解4例,无效2例;术后半年治愈55例(78.6%),明显缓解8例,部分缓解5例,无效2例。术中AMR存在10例,术后1周治愈3例(30.0%),明显缓解3例,部分缓解3例,无效1例;术后半年治愈2例(20.0%),明显缓解2例,部分缓解4例,无效2例。术后1周治疗有效率为96.3%,术后半年治疗有效率为95.0%。术中AMR消失病人术后1周、术后半年治愈率明显高于术中AMR存在的病人($P<0.05$)。

2.3 *术中FMEP和EMG的监测情况* 80例术中均稳定引出FMEP,释放脑脊液时记录FMEP为基线。72

例术中FMEP波幅无降低和(或)潜伏期无延长;6例术中出现FMEP一过性波幅降低和(或)潜伏期延长,暂停手术操作并冲洗温生理盐水后恢复;2例术中出现FMEP波幅降低,但潜伏期无延长,暂停手术操作并冲洗温生理盐水无改善,术后出现面瘫,治疗改善,考虑术中面神经滋养动脉痉挛引起的损伤。80例在分离和探查面神经REZ时均出现EMG不同程度的反应,其中一过性反应71例,持续出现的面神经爆发肌电图反应9例,暂停手术操作后均缓解。

3 讨 论

HFS的主要病因是面神经根部受到周围一条或者多条血管的压迫。MVD为治疗HFS的首选手术方法[5],误认责任血管是MVD失败的主要原因,因此术中发现非典型性隐匿责任血管对提高手术疗效具有重要意义[6]。神经电生理监测辅助MVD能够实时监测脑内血管及神经电位、神经传导反应的改变,协助术者安全且精确地找到责任血管及病变位置[2]。若监测仪器出现监测目标的异常波形变化,就会发出警示信号,立即暂停操作,从而有效避开该区域的细小血管与神经,以免血管及神经的损伤,提高手术疗效,减少并发症[7]。

AMR是MVD中神经电生理监测的可靠指标。术中对患侧面神经的一个分支进行电刺激,在另一分支所支配的肌肉处可记录刺激产生的AMR。MVD中也会出现一支AMR波不出现或者消失不完全的情况,所以监测多支神经的AMR波能够有效地增加AMR的监测率[8],有利于判断责任血管与面神经之间是否充分减压,还可识别分离的血管是否为责任血管[9]。本文术中AMR消失病人术后半年延迟治愈增加3例(3.75%),部分缓解增加1例(1.25%)。这提示术中AMR消失的病人会随术后时间的推移而治愈。

FMEP可反映从初级运动皮质到面部肌肉运动通路的完整性,术中提示面神经损伤的临界值并连续调整手术操作,以免造成不可逆的面神经损伤[10]。有学者发现HFS术后AMR未消失,可能与面神经核及面神经过度兴奋所致,而FMEP能反映面神经核的兴奋性,可明确其原因[7]。FMEP能识别潜伏病因及监测神经完整性,在预测术后神经早期和晚期功能方面具有高度可靠性。

EMG可记录HFS病人眼轮匝肌、口轮匝肌等面部肌肉的自发肌电活动,持续高频的神经紧张放电是神经损伤的表现。研究表明MVD中AMR+EMG监测可辨认责任血管、评估减压效果及减少神经损伤相关并发症[11]。虽然AMR是否消失及EMG持续时间、波形类型在预测疗效方面的作用较为有限,但MVD后AMR消失和EMG时间缩短表明血管压迫引起的面神经纤维损伤是HFS的主要病因,为MVD治疗血管压迫引发的HFS提供了理论支持。

综上所述,应用多模式神经电生理监测较单一神经电生理监测更可靠。AMR+FMEP+EMG监测可实时且精准监测MVD进程,寻找并减压真正的神经血管受压部位、保护处于危险情况的神经[12],保证神经传导通路的完整性,在确保面神经充分减压、提高手术疗效、降低周围神经的损伤、减少神经不可逆损伤等术后并发症的发生具有重要作用。

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佳的救治。但该病预后的影响因素较多，本文病例数量较少，有待进一步研究，以便为缺血性脑卒中的救治提供帮助。

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