

doi: 10.13241/j.cnki.pmb.2019.18.016

肌电图检查评估腕管综合征手术效果的临床分析

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摘要 目的:探讨采用肌电图检查评估腕管综合征的手术治疗效果。**方法:**选取 35 例(患侧手共 39 侧)临床确诊为腕管综合征并接受腕管切开减压术治疗的患者,于手术前后分别行肌电图检查,应用正中神经传导检查和拇短展肌针极肌电图检查,分析患者手术前和手术后腕部正中神经功能的变化情况。**结果:**手术后,患者正中神经感觉传导潜伏期异常率(33%)、正中神经运动传导潜伏期异常率(36%)较术前(72%、74%)明显下降($P<0.05$),正中神经感觉传导波幅(7.40 ± 5.05)较术前(4.86 ± 3.60)显著降低($P<0.001$),拇短展肌静息状态下失神经电位的异常率(69%)、重收缩时募集电位异常率(13%)均较术前(85%、26%)明显下降($P<0.05$)。患者手术前后正中神经感觉传导速度和运动传导速度对比差异无统计学意义($P>0.05$)。**结论:**腕管切开减压术可解除正中神经卡压状态,明显恢复正中神经功能,增强拇短展肌肌力,临床治疗效果好。肌电图检查可为腕管综合征患者手术治疗效果的评价提供客观的依据。

关键词:腕管综合征;肌电图;腕管切开减压术;手术效果

中图分类号:R741.044;R745 文献标识码:A 文章编号:1673-6273(2019)18-3478-04

Clinical Analysis of Electromyography in Evaluating the Surgical Effect of Carpal Tunnel Syndrome

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ABSTRACT Objective: To evaluate the surgical treatment effect of carpal tunnel syndrome by electromyography. **Methods:** A total of 35 patients (39 sides of the affected hand) who were clinically diagnosed with carpal tunnel syndrome and underwent open carpal tunnel release surgery were selected. Electromyography was performed before and after operation. The median nerve conduction test and the needle electromyography of abductor pollicis brevis muscle were used to analyze the changes of median nerve function in the wrist before and after surgery. **Results:** After surgery, the abnormal rate of median nerve sensory conduction latency (33%) and median nerve motor conduction latency (36%) was significantly lower than that before surgery (72%, 74%) ($P<0.05$). Median nerve sensory conduction amplitude (7.40 ± 5.05) was significantly lower than that before surgery (4.86 ± 3.60) ($P<0.001$). The abnormal rate of denervation potential (69%) in the resting state of abductor pollicis brevis muscle and the abnormal rate of heavy contractive recruitment potential (13%) were significantly lower than those before surgery (85%, 26%) ($P<0.05$). There was no statistically significant differences in median nerve sensory conduction velocity and motor conduction velocity between patients before and after surgery ($P>0.05$). **Conclusion:** Open carpal tunnel release surgery can relieve the entrapment state of median nerve, obviously restore the function of median nerve, and enhance the muscle strength of the abductor pollicis brevis muscle. The electromyography examination can provide an objective basis for the evaluation of surgical treatment effect in patients with carpal tunnel syndrome.

Key words: Carpal tunnel syndrome; Electromyography; Open carpal tunnel release surgery; Surgical effect

Chinese Library Classification (CLC): R741.044; R745 **Document code:** A

Article ID: 1673-6273(2019)18-3478-04

前言

腕管综合征(Carpal tunnel syndrome, CTS)是由于各种原因使腕管内压力增高,导致正中神经受压而产生相应的感觉和功能障碍^[1]。CTS 是手外科常见病^[2],也是肌电图室最常见的嵌压性周围神经病,以中年女性多见,男性常有职业病史^[3],临床表现为腕部正中神经支配区域(拇指、示指、中指和环指桡侧半)感觉异常和(或)麻木,严重者出现手部肌肉无力、拇短展肌萎缩等

症状^[4]。目前,肌电图检查(Electromyography, EMG)是临床诊断 CTS 的金标准^[5]。腕管切开减压术是该病临床常规手术治疗方法^[6]。本研究主要探讨应用肌电图检查分析腕管切开减压术治疗 CTS 临床效果的价值。

1 资料与方法

1.1 临床资料

选择 2016 年至 2018 年 35 例临床确诊为 CTS 的患者,患

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(收稿日期:2019-04-08 接受日期:2019-04-28)

侧手共 39 例,均来自我院手外科并接受腕管切开减压术治疗。其中,男 9 例,女 26 例,年龄 24~76 岁,平均(55.14 ± 10.88)岁,病程 6 个月至 15 年,平均 28 个月,术后肌电图检查随访时间平均 16 个月。所有病例均具有典型 CTS 临床表现并且排除伴发其他周围神经病、严重系统性疾病及严重精神障碍者。临床查体:腕掌屈试验(Phalen Sign)阳性 34 例;腕掌部正中神经叩击征(Tinel Sign)阳性 33 例;拇短展肌肌力减弱或肌萎缩 9 例。

1.2 方法

1.2.1 仪器 应用丹麦 Keypoint4 通道肌电诱发电位仪进行神经传导-EMG 检测,室温 25℃左右,患侧肢体温度 32℃左右。

1.2.2 传导检查 ① 感觉神经传导检测:用指环电极刺激示指,用双极刺激电极于正中神经腕部及肘部接收,获得正中神经感觉传导(腕-肘)速度(Sensory nerve conduction velocity, SCV)、(示指-腕)远端潜伏期(Latency, Lat)及(示指-腕)波幅(Amplitude, Amp)。② 运动神经传导检测:用双极刺激电极分别在腕部及肘部刺激正中神经,同心圆针电极于拇短展肌接收,获得正中神经运动传导(肘-腕)速度(Motor nerve conduction velocity, MCV)及(腕-拇短展肌)远端潜伏期(Lat)。

1.2.3 EMG 检测 采用同心圆针电极插入正中神经支配的拇短展肌,观察肌肉在静息状态下有无失神经电位(纤颤电位、正相电位、插入延长),轻收缩时运动单位电位的波形、时限、波幅、多相波百分比,以及重收缩时募集电位的类型及峰值电压。

1.2.4 手术治疗 本次研究所有病例均行腕管切开减压术治疗。

1.3 判定标准

正常范围判定:正中神经感觉传导 SCV 正常值为 50.0~74.0 m/s;Lat 正常值为 2.4~4.4 ms;Amp 正常值为大于 5 μ v。正中神经运动传导 MCV 正常值为 51.2~71.8 m/s;Lat 正常值为 2.6~4.4 ms。当 MCV 正常而 Lat 大于 4.4 ms,则提示正中神经可能在腕部受到卡压^[7]。针极 EMG 拇短展肌静息电位见纤颤波和正相波伴(或不伴)插入延长为异常;重收缩时募集电位呈干扰相或近干扰相为正常,呈混合相、近混合相、单纯相或电静息则为异常。

1.4 统计学分析

本研究数据应用 SPSS 22.0 统计软件进行分析处理,神经传导 Lat、针极 EMG 失神经电位和重收缩募集电位计数资料以频数和百分比[n(%)]表示,采用秩和检验进行分析;SCV、Amp 和 MCV 计量资料以均数 $\pm$ 标准差($\bar{x} \pm s$)表示,采用配对样本 t 检验进行分析,以 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 正中神经传导异常的情况分析

2.1.1 潜伏期 本次研究 35 例 CTS 患者,患侧手共 39 例。于手术前后分别进行正中神经感觉和运动传导功能检查,手术后感觉传导潜伏期(Sensory nerve conduction latency, SNC-Lat)异常率(33%)比手术前(72%)明显下降,差异有统计学意义($P < 0.05$);运动传导潜伏期(Motor nerve conduction latency, MNC-Lat)异常率(36%)比手术前(74%)明显下降,差异有统计学意义($P < 0.05$)。见表 1。

表 1 CTS 患者手术前后正中神经传导远端潜伏期(Lat)检查结果的比较[例(%)]

Table 1 Comparison of the median nerve conduction distal latency (Lat) in patients with CTS pre-operation and post-operation[n(%)]

	Time	n	Normal (≤ 4.4 ms)	Prolong (>4.4 ms)	Undetected	Total abnormal rate
SNC-Lat	Pre-operation	39	11 (28)	21 (54)	7 (18)	28 (72)
	Post-operation	39	26 (67)	10 (26)	3 (8)	13 (33)
MNC-Lat	Pre-operation	39	10 (26)	24 (62)	5 (13)	29 (74)
	Post-operation	39	25 (64)	12 (31)	2 (5)	14 (36)

Note: Comparison between pre-operation and post-operation, SNC-Lat $P=0.001$, MNC-Lat $P=0.001$.

2.1.2 传导速度 患者手术后正中神经 SCV (62.63 ± 4.63)与手术前(61.77 ± 5.43)对比差异无统计学意义($P > 0.05$);患者手术后正中神经 MCV(61.71 ± 4.62)与手术前(59.78 ± 5.06)对比差

异无统计学意义($P > 0.05$);患者手术后感觉传导 Amp(7.40 ± 5.05)与手术前(4.86 ± 3.60)明显升高,差异有统计学意义($P < 0.001$)。见表 2。

表 2 CTS 患者手术前和手术后正中神经传导功能检查结果的比较($\bar{x} \pm s$)

Table 2 Comparison of the median nerve conduction function examination in patients with CTS pre-operation and post-operation($\bar{x} \pm s$)

	Time	n	SCV (m/s)	Amp (μ v)	MCV (m/s)
	Pre-operation	39	61.77 ± 5.43	4.86 ± 3.60	59.78 ± 5.06
	Post-operation	39	62.63 ± 4.63	7.40 ± 5.05	61.71 ± 4.62
	P		$P=0.534$	$P=0.00015$	$P=0.134$

2.2 拇短展肌 EMG 异常的情况分析

2.2.1 失神经电位 患者针极 EMG 检查结果显示拇短展肌静息状态下所有患者均出现失神经电位,手术后出现中等量

大量失神经电位的异常率(69%)比手术前(85%)明显下降,差异有统计学意义($P < 0.05$)。见表 3。

2.2.2 重收缩募集电位 患者针极 EMG 检查结果显示拇短展

肌重收缩时募集电位异常率(13 %)比手术前(26 %)明显下降, 差异有统计学意义($P<0.05$)。见表 4。

表 3 CTS 患者拇短展肌肌电图检查失神经电位结果比较[例(%)]

Table 3 Comparison of the electromyography of the abductor pollicis brevis muscle denervation potential in patients with CTS pre-operation and post-operation[n(%)]

Time	n	Denervation potential				
		Little	Medium without insert extension	Medium with insert extension	Many	Abnormal rate
Pre-operation	39	6 (15)	7 (18)	18 (46)	8 (21)	33 (85)
Post-operation	39	12 (31)	13 (33)	8 (21)	6 (15)	27 (69)

Note: Comparison between pre-operation and post-operation, $P=0.026$.

表 4 CTS 患者拇短展肌肌电图检查重收缩募集电位结果比较[例(%)]

Table 4 Comparison of the electromyography of the abductor pollicis brevis muscle heavy contractive recruitment potential in patients with CTS pre-operation and post-operation[n(%)]

Time	n	Heavy contractive recruitment potential					
		Interference phase	Nearly interference phase	mixed phase	Nearly mixed phase	Single phase	Electrical silence
Pre-operation	39	2 (5)	27 (69)	0 (0)	3 (8)	2 (5)	5 (13)
Post-operation	39	8 (21)	26 (67)	2 (5)	1 (3)	0 (0)	2 (5)

Note: Comparison between pre-operation and post-operation, $P=0.023$.

3 讨论

CTS 是正中神经在腕管内被卡压的一组症状和体征^[8-10]。腕管由腕屈肌支持带与腕骨沟围成,由于其出入径口小,则正中神经容易在此处卡压,从而产生一系列病理改变^[11-13]。CTS 早期病理改变以脱髓鞘为主,主要影响感觉神经纤维,多数患者因感觉症状如麻木、疼痛前来就诊^[14-17]。当病情进一步发展,正中神经压迫性缺血,逐渐造成轴索变性及神经纤维化。晚期累及到运动神经纤维时会出现手指无力、不能持重物,逐渐发展为拇短展肌萎缩^[18]。CTS 晚期肌肉失去神经支配后,肌纤维对血液中的乙酰胆碱敏感性增高,故可见失神经电位;由于神经纤维的不同程度损害,在大力收缩时募集的运动单位总数减少,故出现募集电位衰弱(混合相、近混合相或单纯相)^[19]。CTS 典型临床症状为正中神经支配区域,即手掌桡侧 3 个半手指区域感觉减退、麻木、疼痛,经休息或甩手后症状可部分缓解,后期可出现拇短展肌无力、萎缩和活动障碍^[20,21],女性多发,一般优势侧手发病更常见^[22-23]。体格检查可出现 Phalen Sign 和 Tinel Sign 试验阳性^[24]。

临床上,诊断 CTS 主要依靠典型的病史、临床症状和体征,神经电生理检查是明确诊断 CTS 的临床常用检查方法^[25,26]。肌电图检查对该病的早期诊断及治疗有重要的指导意义^[27]。该病治疗分为保守治疗和手术治疗,早期可采取保守治疗,对于保守治疗后症状仍不能缓解的患者,则需考虑手术治疗^[28-31]。手术治疗目的是解除压迫正中神经的各种因素,彻底松解正中神经从而消除神经压迫的症状^[32-35]。腕管切开减压术是切断屈肌支持带并解除正中神经卡压的手术方法,是手外科治疗 CTS 的经典常用方法^[36]。

本次研究显示 CTS 患者手术前正中神经感觉和运动传导

潜伏期均明显延长,感觉传导波幅降低,拇短展肌失神经电位检出率 100 %,26 %的患者出现募集电位异常,提示正中神经卡压并且存在神经功能障碍。CTS 患者手术后正中神经感觉和运动传导潜伏期与手术前组相比均明显缩短,感觉传导波幅明显升高,拇短展肌静息状态下失神经电位发放量明显减少,重收缩时募集电位异常率下降至 13 %。由此可见,腕管切开减压术可解除正中神经卡压状态,明显恢复正中神经功能,增强拇短展肌肌力,临床治疗效果满意。

综上所述,手术前应用肌电图检查可以通过判断患者正中神经的损伤情况对 CTS 进行明确诊断,为临床手术治疗提供参考依据,并协助医师判断患者术后预后及转归;手术后应用肌电图检查,通过检查患者正中神经功能的恢复情况,与手术前各项检查数据进行对比分析,从而判断出患者的预后情况,是患者手术后复查时检验手术疗效的敏感指标。因此,肌电图检查对 CTS 患者手术疗效的评估提供了客观的依据,具有重要的临床应用价值。

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