

兔坐骨神经钳夹伤后的电生理研究

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摘要:本文对兔坐骨神经钳夹伤后的电生理研究结果表明:1. 神经损伤后第 10 天肌电图(EMG)表现有插入电位延长,延长时间随神经再生而逐渐缩短。2. 损伤后第 20 天可记录到再生小电位。3. 诱发肌肉收缩电位于神经损伤后 30 天可记录到。4. 推算神经再生速度平均为 2.83mm/日,最快可达 4mm/日。本研究旨在对神经再生的临床判断及有关研究提供参考。

关键词:坐骨神经 肌电图 神经再生 兔 实验研究

本实验通过对兔坐骨神经钳夹伤后再生的电生理特性进行观察,以得到兔坐骨神经损伤后再生过程的电生理学变化特点,为周围神经损伤早期的电生理学研究提供参考。

实验材料与方法

实验动物选用大耳白兔 2.5~3.5kg(雌雄不拘)、戊巴比妥钠(30mg/kg)静脉麻醉,手术分离显露一侧坐骨神经以备损伤及刺激用。双极银丝钩状电极作为诱发单个肌肉收缩电位的刺激电极,实验时置于坐骨神经拟损伤处近侧端。记录电极为同心圆针电极,分别置于胫前肌及腓肠肌肌腹。坐骨神经损伤为定量钳夹伤(140g/mm²)造成 Seddon 周围神经二度损伤^[1]。于神经损伤前后即刻,第 10 天,20 天,30 天,40 天时记录动物麻醉状态下其静息肌电图及诱发单个肌肉收缩电位,并推算神经传导速度及神经再生速度。

$$\text{传导速度 } V = \frac{\text{刺激点到记录点距离}}{\text{潜伏期}}$$

潜伏期从刺激伪迹开始到动作电位第一个向上波峰点。

$$\text{再生速度 } V = \frac{\text{损伤点到记录点距离}}{\text{恢复时间}}$$

实验在 Disa 丹麦肌电仪上进行,刺激波形为方波单个脉冲刺激,波宽 0.5ms。正常刺激量为重复得到较清晰诱发电位图形为准。损伤后以 2 倍于正常刺激量刺激。

结 果

1. 正常电生理学特性:

在麻醉状态下,正常胫前肌及腓肠肌静息肌电图为一稳定基线,无异常电位活动,在终

板可记录到终板电位。

神经肌肉正常状态下可记录到诱发单个肌肉收缩电位,计算出兔胫前肌及腓肠肌传导速度。结果:胫前肌传导速度平均为 24.53m/s (n=9)腓肠肌传导速度平均为 24.02m/s (n=9)。

2. 神经损伤后的神经肌肉电生理学特性:

①静息肌电图:损伤后即刻胫前肌及腓肠肌无异常电位活动,静息肌电图表现为一稳定基线。插入电位延长于损伤后第 10 天可记录到,占总例数 100%。延长时间不等,平均为 37 秒;第 20 天插入电位延长时间同体对照均较前缩短,插入电位延长时间平均为 27 秒,较前缩短 27%;第 30 天,40 天插入电位延长时间仍继续较前缩短,平均为 19.4 秒,10 秒,与第 10 天比较,延长时间分别缩短 47%及 73%。

损伤后第 10 天同时可记录到正相电位的占 50%,纤颤电位占 26%;第 20 天正相及纤颤电位出现率相对于第 10 天减少,分别占总例数的 37%及 19%,随着神经的再生,正相电位及纤颤电位出现率继续减低,第 40 天在肌肉放松状态下记录到正相及纤颤电位。初生多相小电位在损伤后第 20 天也可记录到。

②诱发肌电图即诱发单个肌肉收缩电位:胫前肌诱发单个肌肉收缩电位最早于损伤后第 10 天记录到,传导速度为损伤前的 70%;损伤后第 30 天,记录到诱发单个肌肉收缩电位 (n=6),推算其传导速度并与损伤前比较,结果:胫前肌传导速度为损伤前的 44%,腓肠肌传导速度为损伤前的 49%;第 40 天,随着神经

再生修复,传导速度继续增快,与损伤前比较,胫前肌传导速度由 44%提高到损伤前的 64%,腓肠肌传导速度由 49%提高到损伤前的 77%。

③再生速度推算:再生最快一例为每日 4mm,平均运动神经再生速度为每日 2.83mm。

讨 论

临床推算周围神经再生速度主要来自病人感觉、运动功能的检查。有报道认为感觉神经纤维每天长 5mm,运动神经纤维每日长 1.7mm⁽²⁾,而通过病人肌电图检查推算周围神经再生速度每日为 1.5~2.0mm,神经肌肉传导速度在最初 2 年内以每日 3%的增长速度增长⁽³⁾。利用实验电生理研究方法比较实验组及对照组之间周围神经损伤后传导速度恢复情况可作为评价治疗方案的优劣^(4,5)。本实验对兔坐骨神经损伤后再生的电生理特性进行观察,结果表明:正常状态兔胫前肌传导速度为 24.53m/s,腓肠肌传导速度为 24.02m/s。坐骨神经损伤后,20 天可记录到初生再生小电位,再生速度平均为 2.83mm/日,最快可达 4mm/日。周围神经损伤后即刻,静息肌电图无病理

电位出现,也无诱发肌肉收缩电位。但在损伤后第 10 天,均能记录到肌肉放松状态下插入电位延长,同体比较插入电位延长时间随着神经再生修复而逐渐缩短,无一例外。一般认为插入电位延长可能出现在失神经肌纤维;先天性肌强直或强直性肌营养不良;早期变性肌纤维⁽⁶⁾。而本实验插入电位延长时间随着周围神经再生修复而逐渐缩短,插入电位延长时间与肌纤维变性程度有否关系,影响插入电位延长时间的机理尚不清楚。插入电位延长时间可否作为追踪周围神经再生进展的一个指标,尚需作进一步的研究。

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烛泪样骨病 2 例报告

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烛泪样骨病为罕见的骨质硬化性疾病,我院遇到 2 例,现报告如下。

例 1,汪××,女,27 岁。15 岁左右发现左膝关节较健侧增粗,并向外侧弯曲变形,近年来加重,行走时略呈跛行。体检:左下肢较健侧明显增粗,并向外侧弯曲变形。X 线检查:左下肢片示自左半骨盆至趾骨包括髌骨弯,股骨胫骨,跗骨及趾骨之骨皮质及邻近骨松质呈不规则增生,硬化,密度增高,似象牙样,犹如烛油流注,呈滴柱状及斑点状,骨外侧稍粗,髓腔呈不规则狭窄,部分消失,受累部分骨小梁消失,各关节均未受累。

例 2,徐××,女,28 岁,右足背肿痛三年近感着地不利,坐后难于立即行走。体检:右足背肿而触之不光滑,关节活动范围尚可,皮色改变不大。X 线检查,右足骰骨、跟骨、第三楔骨,及第二、三、四趾骨与趾骨均示

明显斑片状密度增高,如象牙样,似蜡油叠积。

讨论:1 烛泪样骨病又称肢骨纹状增生症,或蜡油骨病,本病好侵犯单一肢体,增生之骨质自上而下,附着于一骨或数骨之表面,酷似蜡烛样表面上熔蜡滴柱,故亦称蜡油样骨病,为罕见的骨病,病因不明,为一种骨膜下毛细血管扩张所致的骨膜骨发育异常,临床大多病例发现于 5~20 岁,疼痛感,反复发作,患者表面皮肤可增厚,纤维化,类似硬皮症。

2. 本病的确诊,X 线检查,X 线表现有其典型的征象,在长管状骨皮质呈现连续或断续的硬化骨条或斑块,从近侧向远侧伸延,多局限于一侧骨皮质,骨表面高低不平,示熔化而滴流之蜡油,密度极高,如象牙样。

Abstract of Original Articles

A motive study of the capillary permeability during wound healing — First session of research program on “leaning on the pus to promote regeneration”

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Improved Saba capillary permeability experiment method was adopted in studying the mechanism of external application of Chinese herbs based on the theory of “leaning of the pus to promote regeneration” over the wound surface. The result of experiment indicated that external application of the Chinese herb could enhance local capillary permeability of the wound surface. There was significant difference ($P < 0.05$) between external application of the Chinese herb group and the control group during middle stage of healing of the wound surface with local fluorescent concentration method. But there was no significant difference ($P < 0.05$) between them with local plasma fluorescent clearance rate method and urinary excretion rat. It suggested that external application of the Chinese herb did not influence the capillary permeability of the body as a whole. It bears prominent regulating action of local capillary permeability.

Key words Capillary permeability External application of Chinese herb
Healing of the wound surface

(Original article on page 5)

Influence of experimental adhesion of flexor tendon treated with Injection Chuanxiongqin (CXQ)

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In this article, the influence of Injection CXQ in the treatment of adhesion of chichen deep flexor tendon model was observed and it was compared with antiadhesive action of dimethicone and normal saline. The results showed that sliding function of the CXQ and dimethicone group was better in small adhesion surface of the injured tendon. There were significant difference ($P < 0.05, P < 0.01$) as compared with normal saline group. But in aspect of repairment of the tendon, the CXQ group was superior than the dimethicone group. It indicated that locally application of injection CXQ within the sheath of the tendon bears both the action of alleviation of the peri-tendoneous adhesion and doesn't influence of healing process of the tendon itself.

Key words Injection Chuanxiongqin Adhesion of flexor tendon
Prophylactic and treatment

(Original article on page 8)

Electrophysiological study on rabbit sciatic nerve after clamp injury

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In this article ,the results of electrophysiological study on rabbit sciatic nerve after clamp injury indicated that firstly there were prolongation of insertion potential of EMG ten days after injury of the nerve,the duration shortened gradually along with regeneration of the nerve. Secondly ,regeneration small potentials could be recorded at 20 days post—traumatically. Thirdly, induced muscular contraction potentials could be recorded 30 days after nerve injury . Fourthly, the average standard nerve regeneration velocity was 2. 93mm/day,the utmost being 4mm/day. The aim of study is to offer a clinical criteria of nerve regeneration and a reference of related researches.

Key words Sciatic nerve Electromyography
Nerve regeneration Rabbit

(Original article on page 11)

A comment on treatment of traumatic obstinate swollen of the limb based on the theory of phlegm

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In this article ,treatment of traumatic obstinate swollen of the limb based on TCM theory of phlegm obtained good results. Thirty six caese were treated and cured copmletely. The theoretical basis and foundation of treatment based on the theory of phylegm were discussed in detail.

Key words Swollen of limb Traditional Chinese medicinal therapy

(Original article on page 13)

A preliminary exploration of biomechanics on fracture of tibial plateau treated with prize—poke reduction method

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Ten cases of fracture of tibial plateau treated by prize—poke reduction method with bone fracture round mail. Two nails were applied simultaneously in 4 cases of which the degree of cave in excessed more than 10mm. The remote therapeutic results after reduction were good in 7 cases;3, fair. Analysis of the principle based on biomechanics of reduction with the prize—poke method ,fixation and physical exercise were performed, it is realized that it coincides with the principle of biomechanics.

Key words Fracture of tibial plateau Prize—poke method Biomechanics

(Original article on page 31)