实验研究

# 纤维蛋白粘合剂、ZT 胶与缝合法吻接周围神经效果的比较

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**摘要** 将 45 只大白鼠随机分为三组，切断右侧坐骨神经，第一组用纤维蛋白粘合剂吻接，第二组用 ZT 胶行神经外膜粘接，第三组用 9～0 针线行常规神经外膜缝合。术后分别于 1、2、3 月时将每组动物各取 5 只检测，通过电生理学、组织学及电镜超微结构的观察来评价三种方法的效果。结果表明，纤维蛋白粘合剂、ZT 胶的修复效果与缝合法无显著差异，并有简便，省时省力，无神经损伤，对位准确等优点，有较高的临床应用价值。

**关键词** 组织粘合剂 周围神经损伤

缝合法修复周围神经损伤的技术在临床上已沿用了几个世纪，虽经不断改进，但仍存在诸多缺陷，如会损伤神经外膜和神经束膜，易损害神经营养血管，激发机体对异物的反应等，严重影响其临床治疗优良率[1]。国内外学者已着手研究用无缝线吻接的方法来替代缝合法[2~4]。我们分别采用纤维蛋白粘合剂和 ZT 胶吻接大白鼠坐骨神经，并与缝合法的修复效果作了比较。

## 材料及方法

选用成年 Wister 大白鼠 45 只，雌雄不限，体重为 300～400g，以右侧坐骨神经为实验对象。采用的纤维蛋白粘合剂由上海生物制品研究所提供，ZT 胶由西安化工研究所医用胶研究室提供。

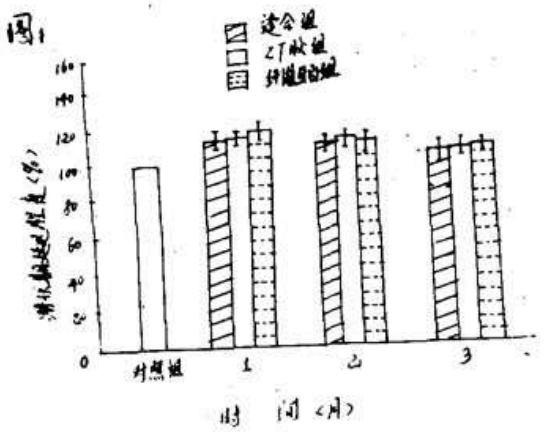
1. 分组及手术方法：将动物分为 A、B、C 三组，每组 15 只，各组再根据观测时间分为 1、2、3 月三个组。1%戊巴比妥钠腹腔注射麻醉，动物俯卧位固定，取右侧股后部弧形切口，在手术显微镜下(×10)暴露坐骨神经，于膝上 2cm 处切断。A 组(纤维蛋白粘合组)：以神经干表面血管为标志，靠拢神经断端，助手将配好的两种粘合液成份取等量滴入断端，术者准确对接后固定 1～2 分即可。B 组(ZT 粘合组)：以同法对合神经两端，术者用一针柄蘸少许 ZT 胶涂抹于神经外膜接合处，数秒钟内形成一半透明硬质膜，翻转神经 180°，同法粘合对侧。C 组(缝合组)用 9～0 无创伤缝合针线常规外膜缝合 4～6 针。

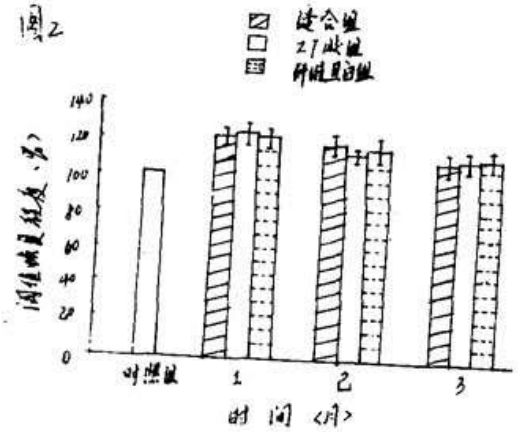
2. 观察指标：(1)肌电图检测：用日本产 MEM－3202 型肌电图仪测试诱发肌电图。记录实验侧及对侧坐骨神经诱发肌电图的阈值、潜伏期及波幅。刺激电极刺入股骨大转子内侧 1cm 处，深约 2cm，记录电极于足跟上 2cm 刺入腓肠肌，地线刺入尾根部，使用单个电刺激，刺激时间为 0.1ms，强度由小渐增至诱发肌电位出现，记录阈值。然后刺激强度增大至 100μv，刺激时间不变，记录潜伏期及波幅。(2)组织学检查：取各时间组神经吻合口远近两端各约 1cm 的神经标本，10%福尔马林固定，石蜡包埋切片后，分别做 HE 染色，Weil 氏铁明矾苏木素染色[5](观察神经髓鞘)，改良的 Bielschowsky 氏法染色[5](观察神经原纤维)，以判断术后不同时期神经纤维的再生状况。(3)电镜观察：以吻合口为中心，切取 $1mm^3$ 标本，固定包埋，切片后在 JOEL－JEM－100X 型透射电镜下观察。

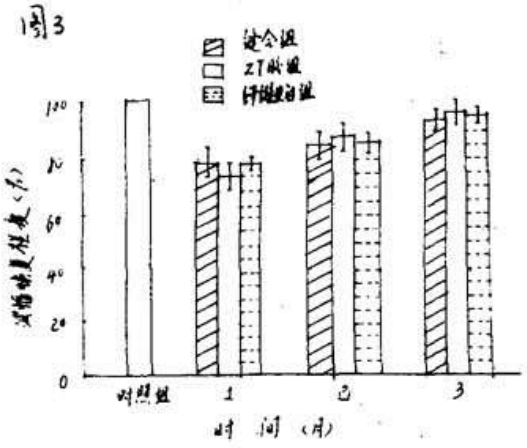
## 实验结果

1. 肌电图结果：将所测得的数据转换为相应的参数指标，即：阈值恢复程度＝实验侧阈值/正常侧阈值×100%；潜伏期延长程度＝实验侧潜伏期/正常侧潜伏期×100%；波幅恢复

程度＝实验侧波幅/正常侧波幅×100%。用方差分析进行统计学处理，结果显示 1 月、2 月、3 月时各组的阈值恢复程度，潜伏期延长程度及波幅恢复程度均无显著差异。（见图 1、2、3）。







2. 组织学结果：在光镜下，三组神经再生情况基本相同，只是在早期粘合法的神经吻合口处仅可见少量散在淋巴细胞，纤维排列有序，结构清晰，而缝合的神经吻合口处却有大量成群的淋巴细胞，神经有不同程度的扭曲，这种形态上的差异随时间的延续而逐渐减小。

3. 电镜观察：三组神经在一月时开始具有正常的轴突结构，髓鞘呈板层状，其明板、暗板及暗线清晰可见，雪旺氏细胞由活跃状态逐渐进入稳定状态。三组之间的差别在于缝合组再生神经髓鞘周围出现了较多的成纤维细胞，纤维细胞及相伴随的胶原纤维增生，而在两个粘合组中则很难看到。

## 讨　论

用粘合剂来替代缝合材料是近年来外科学的一项重大进展。纤维蛋白粘合剂是生物粘合剂的代表，粘合原理是纤维蛋白原在钙离子激活的凝血酶的作用下转变为纤维蛋白单体，再形成可溶性的聚合物，凝缩而牵拉，接合创缘，它在体内可完全吸收。ZT 胶是一种化学粘合剂，其主要化学成份是 α－氰基丙烯酸酯类化合物，具有室温固化，固化速度快，胶接强度大等特点。这两类粘合剂已开始应用于多科临床，但用它们修复周围神经损伤的报道不多。

我们通过实验证明，用两种粘合剂吻接神经，其效果相同于传统的缝合法，从而均不失为修复神经损伤的有效方法。此外，它们还具有如下优点：1. 吻合迅速，明显缩短手术时限。实验粘合一条神经仅需 1～2 分钟，而缝合则需 6～8 分钟。2. 操作简便，易于推广，有很高的临床价值。3. 对神经的损伤很轻微，对位准确。由于生物粘合剂在体内可完全吸收，异物反应非常轻微，既可粘合外膜，也可粘接束膜，因而作者认为，它较化学粘合剂有更大的研究应用价值。

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# Abstract of Original Articles

**Clinical and experimental studies on relation between derangement of lumbar posterior facet joints and posteromedial branch of lumbar spinal nerve**

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Via analysis of 53 cases of derangement of lumbar posterior facet joints, and based on the cause of lumbago, they were grouped into periarticular and intraarticular two types. Through microanatomical observation of 100 posterior medial branch of lumbar spinal nerve from 10 cadavers, it was proved that the posterior facet joints were chiefly innervated by posteromedial branch. They were compressed by multiple factors along their course and passage. The pathogenesis and principle of canipulative therapy of the ailmint were explored based on the neuro—anatomical and physiological data.

**Key words** Derangment of lumbar posterior facet joint
Lumbar posteromedial spinal nerve
Manipulative therapy Experimental study

(Original article on page5)

**B ultrasonic analysis on influence of spinal Tuina therapy under analgesic traction in treating protrusion of lumbar intervertebral disc**

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Forty three segments of 38 cases of protrusion of lumbar intervertebral disc were reported. After treated with spinal Tuina therapy under analgesic traction 3 to 6 months the therapeutic results of rate of good and fair were 71% and 87% respectively. The B ultrasonic examination revealed that there were disappearance of the protruded mass in 9 segments, markedly shrinkage in 13, slight shrinkage in 8, no change in 7, enlarged in 6($p>0.05$). Though there was a tendency of shrinkage of the protruded mass as a whole ($P<0.05$), there was no correlation as compared with the therapeutic effects ($P>0.05$). The results indicated that the mechanism of the therapy might be due to displacement and changing of the shape of the protruded mass and removing the pathological factor of the protruded mass exerting on the nerve root or dural sac in various degrees. Whether the protruded mass could return to its original place is not decisive factor in the therapeutic effect.

**Key words** Protrusion of lumbar intervertebral disc
Spinal Tuina B ultrasonic examination
Mechanism of the therapeutic effect

(Original article on page8)

**A comparison on the effectiveness among fibrin binder, ZT gum and suture of the interrupted peripheral nerve**

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Forty five rats were divided into 3 groups at random and their right sciatic nerve were cut by the authors. They were connected with fibrin binder in the first group, the epineurium were adhered with ZT gum in the second group, thread of 90 was used in the suture of the epineurium routinely in the third group. Five animals of each group were tested one, two and three months postoperatively. Effects of these three groups were evaluated with electrophysiological, histological and ultramicroscopic observations. The results indicated that there were no prominent difference among the three methods. The first two measures bear the advantages of simple, save time and easy to be applied, no nerve injury and accurate in end—to—end anastomosis, so they are valuable in clinical application.

**Key words** Tissue binder Peripheral nerve injury

(Original article on page11)

**Malunion of the femoral shaft treated by external fixator**

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Various methods of osteotomy in correction of different kinds of malunion of the femoral shaft and fixed with extrnal fixator were applied. From 1987 to 1991, 23 cases were treated, among them the largest angulation was 50°, shortening of the affected limb being 6cm. During treatment, the average fixation time was 10 weeks. After treatment, the length of limb and function of the hip and knee joint were restored satisfactorily. The advantages of the therapeutic measure were discussed.

**Key words** External fixator
Fracture of the femoral shaft
Malunion

(Original article on page19)

**A report on 88 cases of homotransplantation of decalcified bone**

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Eighty eight cases of homotransplantation of decalcified bone were used in treating benign bone tumor, non—union, chronic osteomyelitis, TB of bone and joints etc. After follow—up of the 55 cases, the results were satisfactory. The author realized that the result of X-ray changes were closely related with the interval of follow—up. The rate of complete restoration and basic restoration could elevate prominently along with the prolongation of the interval. So, decalcified bone powder is a good biological bone transplanting material. It is worthwhile to introduce to our colleagues.

**Key words** Decalcified bone powder
Induced to bone formation
Bone defect

(Original atricle on page24)