·疼痛·

# 腰神经后支脉冲射频术联合神经阻滞术治疗老年腰椎骨质疏松性椎体压缩骨折疼痛的疗效分析

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【摘要】　目的　探讨腰神经后支脉冲射频术联合神经阻滞术治疗老年腰椎骨质疏松性椎体压缩骨折疼痛的有效性。方法　共 76 例老年腰椎骨质疏松性椎体压缩骨折疼痛患者,分别采用腰神经后支阻滞术(37 例)和腰神经后支脉冲射频术联合神经阻滞术(39 例),采用视觉模拟评分(VAS)、Oswestry 功能障碍指数(ODI)和 12 条简明健康状况调查表(SF-12)评价手术疗效。结果　与治疗前相比,腰神经后支阻滞术组和腰神经后支脉冲射频术联合神经阻滞术组患者治疗后 VAS 和 ODI 评分降低(均 $P = 0.000$),SF-12 量表 8 个维度(躯体功能、躯体角色、疼痛、健康状况、活力、社会功能、情绪、心理卫生)评分和总评分升高(均 $P = 0.000$);与腰神经后支阻滞术组相比,腰神经后支脉冲射频术联合神经阻滞术组患者治疗后 VAS 和 ODI 评分降低($P = 0.044, 0.027$),SF-12 量表 8 个维度(躯体功能、躯体角色、疼痛、健康状况、活力、社会功能、情绪、心理卫生)评分和总评分升高($P = 0.032, 0.037, 0.028, 0.024, 0.035, 0.047, 0.038, 0.026, 0.029$)。结论　与腰神经后支阻滞术相比,腰神经后支脉冲射频术联合神经阻滞术治疗老年腰椎骨质疏松性椎体压缩骨折疼痛的临床疗效更显著,值得临床推广应用。

【关键词】　骨折,压缩性;　骨质疏松;　腰椎;　疼痛;　脊神经;　脉冲射频(非 MeSH 词);　神经传导阻滞

The clinical effect of pulse radiofrequency via posterior branch of lumbar nerve combined with nerve block in the treatment of senile lumbar osteoporotic compression fracture pain
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【Abstract】　Objective　To explore the clinical effect of pulse radiofrequency via posterior branch of lumbar nerve combined with nerve block in the treatment of senile lumbar osteoporotic compression fracture pain. Methods　A total of 76 patients with senile lumbar osteoporotic compression fracture pain were reported. Thirty-nine cases underwent pulse radiofrequency via posterior branch of lumbar nerve combined with nerve block (combination group), and 37 cases only underwent nerve block via posterior branch of lumbar nerve (control group). Visual Analogue Scale (VAS), Oswestry Disability Index (ODI) and Medical Outcomes Study 12 - Item Short - Form Health Survey (SF - 12) were used to evaluate clinical efficacy. Results　Compared with before treatment, VAS and ODI scores were significantly decreased ($P = 0.000$, 0.000), 8 dimension scores (physical function, physical role, pain, health status, vitality, social function, mood and mental health) and total score of SF - 12 were significantly increased ($P = 0.000$, for all) after treatment in both groups. Compared with control group, VAS and ODI scores were significantly decreased ($P = 0.044, 0.027$), 8 dimension scores (physical function, physical role, pain, health status, vitality, social function, mood and mental health) and total score of SF-12 were significantly increased ($P = 0.032, 0.037, 0.028, 0.024, 0.035, 0.047, 0.038, 0.026, 0.029$) in combination group. Conclusions　Compared with nerve block, the clinical effect of pulse radiofrequency via posterior branch of lumbar nerve combined with nerve block is more prominent in the treatment of senile lumbar osteoporotic compression fracture pain, so it should be used in clinical practice.

【Key words】　Fractures, compression;　Osteoporosis;　Lumbar vertebrae;　Pain;　Spinal nerves;　Pulse radiofrequency (not in MeSH);　Nerve block

随着我国老龄化程度越来越严重,老年人各种疾病发生率逐渐升高,其中骨质疏松性椎体压缩骨折(OVCF)是老年人的常见疾病,受多种因素影响,好发于下胸椎和腰椎等部位,椎体压缩后易发生脊柱稳定性失衡、脊神经后支和脊髓卡压等现象,众多患者合并慢性难治性疼痛,严重影响正常生活和工作。传统治疗方法是脊神经后支阻滞术,近年逐渐应用于临床的脉冲射频术可以使局部组织温度 ≤ 42 ℃,通过调节神经功能达到治疗疼痛且不损伤神经的目的,临床常用于三叉神经痛和腰椎间盘突出症等的治疗,而用于治疗老年腰椎骨质疏松性椎体压缩骨折疼痛的报道极少。本研究对 76 例老年腰椎骨质疏松性椎体压缩骨折疼痛患者行腰神经后支脉冲射频术联合神经阻滞术并探讨其有效性,以为临床治疗提供依据。

## 资料与方法

一、临床资料

1. 纳入标准 (1)腰椎骨质疏松性椎体压缩骨折疼痛的诊断依据:无明显外伤,出现腰背部疼痛症状,不伴下肢放射痛,若姿势改变则疼痛加剧,并经脊椎 CT 和(或)MRI 证实为腰椎骨质疏松性椎体压缩骨折[1]。(2)年龄 50 ~ 90 岁。(3)身体状况可以耐受手术,且无手术禁忌证。(4)本研究经天津港口医院道德伦理委员会审核批准,所有患者或其家属均知情同意并签署知情同意书。

2. 排除标准 (1)腰椎间盘突出症。(2)脊椎恶性肿瘤或转移性肿瘤。(3)合并心、肺、肝、肾等重要脏器功能障碍。

3. 一般资料 选择 2013 年 8 月–2017 年 11 月在天津港口医院疼痛科住院治疗的老年腰椎骨质疏松性椎体压缩骨折疼痛患者共 76 例,男性 42 例,女性 34 例;年龄 60 ~ 77 岁,平均(69.10 ± 3.31)岁;病程 4 ~ 68 d,平均(34.68 ± 13.11)d;根据患者意愿分别采用腰神经后支阻滞术(对照组)或腰神经后支脉冲射频术联合神经阻滞术(联合组)。(1)对照组:共 37 例患者,男性 20 例,女性 17 例;年龄为 60 ~ 77 岁,平均(69.29 ± 3.22)岁;病程 4 ~ 68 d,平均(34.21 ± 13.08)d。(2)联合组:共计 39 例患者,男性 22 例,女性 17 例;年龄 62 ~ 76 岁,平均(68.66 ± 3.29)岁;病程 4 ~ 65 d,平均(35.08 ± 13.12)d。两组患者性别($\chi^2 = 0.043,P = 0.836$)、年龄($t = 0.317,P = 0.601$)和病程($t = 0.418,P = 0.479$)差异均无统计学

意义,均衡可比。

二、研究方法

1. 腰神经后支阻滞术 患者俯卧位,腹部垫薄枕,选择受损椎体及其上椎体的双侧脊神经后支,采用 C 型臂 CT 定位目标椎体上关节突与横突的交界部位,以其体表投影为穿刺点,以体积分数为 1% 的利多卡因 4 ml 进行局部麻醉。于 CT 引导下,以长度为 10 cm 的 22G 穿刺针穿刺,正面观穿刺针尖位于椎体上关节突与横突的交界处,侧面观穿刺针尖位于椎间孔下后缘,回抽至无血液和脑脊液为穿刺成功,每一椎体节段均注入复方倍他米松 0.25 ml、2% 利多卡因 1 ml 和生理盐水 3.75 ml,药物总体积为 5 ml。

2. 腰神经后支脉冲射频术联合神经阻滞术 患者体位、麻醉方法和穿刺方法均同对照组。(1)腰脊神经后支脉冲射频术:穿刺成功后将射频电极与射频发生器相连,首先,定位感觉刺激和运动刺激,感觉刺激模式频率 50 Hz、电压 0.50 ~ 1.00 V,将麻木或疼痛所包含的范围加以复制,为缩小治疗的椎体节段,应将疼痛范围进行删减;再进行运动刺激模式刺激,频率 2 Hz、电压 2 V,若未出现肌肉运动,即可推测电极尖端靠近脊神经后支。然后予脉冲射频治疗,针尖电极温度 42 ℃,每一椎体节段治疗时间 > 4 min。(2)神经阻滞术:完成脉冲射频术后,每一椎体节段注入复方倍他米松 0.25 ml、2% 利多卡因 1 ml 和生理盐水 3.75 ml,药物总体积 5 ml。

3. 疗效评价 治疗前后采用视觉模拟评分(VAS)、Oswestry 功能障碍指数(ODI)和 12 条简明健康状况调查表(SF-12)评价疗效。(1)VAS 量表:评价疼痛程度,0 分,无疼痛;1 ~ 3 分,轻度疼痛;4 ~ 6 分,疼痛影响睡眠,但尚可忍耐;7 ~ 10 分,疼痛难以忍耐,严重影响睡眠和食欲。(2)ODI 量表:评价功能障碍程度,包括腰腿部疼痛程度、生活自理能力、提举重物、行走、坐、站立、睡眠、性生活、社会活动和旅行共 10 项内容,每项评分 1 ~ 5 分,总评分 50 分,评分越高、功能障碍程度越严重。(3)SF-12 量表[2]:包括躯体功能、躯体角色、疼痛、健康状况、活力、社会功能、情绪和心理卫生共 8 个维度,每个维度评分为 1 ~ 5 分,总评分 40 分,评分越高、生活质量越佳。

4. 统计分析方法 采用 SPSS 22.0 统计软件进行数据处理与分析。计数资料以相对数构成比(%)或率(%)表示,采用 $\chi^2$ 检验。呈正态分布的计量资料以均数 ± 标准差($\bar{x} \pm s$)表示,行两独立样本的 $t$ 检

**表1** 两组患者治疗前后疼痛程度和功能障碍程度的比较($\overline{x} \pm s$，评分）

**Table 1.** Comparison of the degrees of pain and dysfunction before and after treatment between 2 groups ($\overline{x} \pm s$, score)

| Group | N | VAS | | ODI | |
|---|---|---|---|---|---|
| | | Before treatment | After treatment | Before treatment | After treatment |
| Control | 37 | 7.68 ± 0.78 | 3.77 ± 0.55 | 41.20 ± 2.72 | 29.32 ± 1.77 |
| Combination | 39 | 7.82 ± 0.90 | 2.02 ± 0.23 | 40.89 ± 2.21 | 16.69 ± 1.24 |

VAS, Visual Analogue Scale，视觉模拟评分；ODI, Oswestry Disability Index，Oswestry功能障碍指数。The same for Table 2

**表2** 两组患者治疗前后疼痛程度和功能障碍程度的前后测量设计的方差分析表

**Table 2.** ANOVA for pretest - posttest measurement design of pain and dysfunction degrees before and after treatment between 2 groups

| Source of variation | SS | df | MS | F value | P value |
|---|---|---|---|---|---|
| VAS | | | | | |
| Treatment | 23.121 | 2 | 11.561 | 1.033 | 0.044 |
| Time | 254.233 | 1 | 254.233 | 145.256 | 0.000 |
| Treatment × time | 21.796 | 2 | 10.898 | 5.151 | 0.000 |
| Error between groups | 362.131 | 76 | 4.764 | | |
| Error within group | 64.489 | 76 | 0.848 | | |
| ODI | | | | | |
| Treatment | 170.306 | 2 | 85.153 | 1.468 | 0.027 |
| Time | 1408.072 | 1 | 1408.072 | 4.119 | 0.000 |
| Treatment × time | 197.886 | 2 | 98.943 | 52.536 | 0.000 |
| Error between groups | 478.119 | 76 | 6.291 | | |
| Error within group | 151.619 | 76 | 1.995 | | |

验；两组患者治疗前后 VAS、ODI 和 SF-12 评分的比较，采用前后测量设计的方差分析。以 $P \leqslant 0.05$ 为差异具有统计学意义。

## 结　　果

与治疗前相比，对照组和联合组治疗后 VAS 和 ODI 评分均降低（均 $P = 0.000$），表明无论腰神经后支阻滞术还是腰神经后支脉冲射频术联合神经阻滞术均可以改善老年腰椎骨质疏松性椎体压缩骨折疼痛患者的疼痛程度和功能障碍程度；与对照组相比，联合组治疗后 VAS 和 ODI 评分均降低（$P = 0.044, 0.027$），表明腰神经后支脉冲射频术联合神经阻滞术较腰神经后支阻滞术更显著改善老年腰椎骨质疏松性椎体压缩骨折疼痛患者的疼痛程度和功能障碍程度（表 1，2）。

与治疗前相比，对照组和联合组治疗后 SF-12 量表 8 个维度（躯体功能、躯体角色、疼痛、健康状况、活力、社会功能、情绪、心理卫生）评分和总评分均升高（均 $P = 0.000$），表明无论腰神经后支阻滞术还是腰神经后支脉冲射频术联合神经阻滞术均可以改善老年腰椎骨质疏松性椎体压缩骨折疼痛患者的生活质量；与对照组相比，联合组治疗后 SF-12 量表 8 个维度（躯体功能、躯体角色、疼痛、健康状况、活力、社会功能、情绪、心理卫生）评分和总评分均升高（$P = 0.032, 0.037, 0.028, 0.024, 0.035, 0.047, 0.038, 0.026, 0.029$），表明腰神经后支脉冲射频术联合神经阻滞术较腰神经后支阻滞术更显著改善老年腰椎骨质疏松性椎体压缩骨折疼痛患者的生活质量（表 3～12）。

## 讨　　论

随着人口老龄化的加剧，腰椎骨质疏松性椎体压缩骨折疼痛业已成为老年人群较常见的疾病。

治疗腰椎压缩性骨折引起疼痛的方法较多，但是每种治疗方法的缺陷也很明显。长期服用镇痛药易造成胃损伤，且患者依从性差。开放性手术亦有许多缺点，首先患者依从性差，患者多为老年人，老年人通常不愿意选择开放性手术治疗；其次开放性手术创伤大，并发症多，恢复慢。由于老年人普遍存在骨质疏松，脊柱内固定术操作困难。微创手术包括经皮椎体成形术和经皮椎体后凸成形术，此类手术也存在一些缺陷，患者依从性模糊，很多患者不愿意选择微创手术；疼痛症状缓解不明显，且微创手术适应证较局限，很多患者的病情无法适用于微创手术。微创手术虽然并发症较少，但也可能出现严重致命性并发症。腰椎骨质疏松性椎体压缩骨折后发生腰椎高度部分丧失和关节失稳等，导致腰骶部难治性疼痛，对患者生活质量造成极大影响，且易引发多系统功能障碍等并发症，其神经支配主要来源腰神经后支。

解剖学研究显示，腰神经后支较纤细，自椎间孔发出，向后经骨纤维孔，在下位椎体横突根部上缘与上关节突外侧之间向后下方走行，直至横突间肌内侧缘。腰神经后支在走行过程中经横突、关节突和韧带构成的骨纤维孔，以及腰椎乳突与副突间的骨纤维管。上述结构发生骨质增生、错位或韧带硬化时，腰神经后支由于受到压迫或刺激而产生剧烈疼痛[3]。临床研究显示，腰部疼痛的原因主要与腰神经后支支配结构的解剖学或电生理学异常存

**表 3**　两组患者治疗前后生活质量的比较($\overline{x} \pm s$,评分)
**Table 3.**　Comparison of quality of life before and after treatment between 2 groups ($\overline{x} \pm s$, score)

| Group | N | Physical function | | Physical role | | Pain | |
|---|---|---|---|---|---|---|---|
| | | Before treatment | After treatment | Before treatment | After treatment | Before treatment | After treatment |
| Control | 37 | 2.35 ± 0.69 | 3.68 ± 0.96 | 2.09 ± 0.67 | 3.15 ± 0.78 | 2.29 ± 0.78 | 3.32 ± 0.96 |
| Combination | 39 | 2.37 ± 0.72 | 4.66 ± 1.15 | 2.16 ± 0.73 | 4.45 ± 1.27 | 2.35 ± 0.82 | 3.97 ± 0.96 |

| Group | N | Health status | | Vitality | | Social function | |
|---|---|---|---|---|---|---|---|
| | | Before treatment | After treatment | Before treatment | After treatment | Before treatment | After treatment |
| Control | 37 | 1.87 ± 0.63 | 2.62 ± 0.74 | 2.27 ± 0.69 | 3.66 ± 0.92 | 2.02 ± 0.65 | 3.18 ± 0.78 |
| Combination | 39 | 1.90 ± 0.66 | 3.54 ± 0.95 | 2.15 ± 0.69 | 4.33 ± 1.02 | 2.00 ± 0.70 | 4.16 ± 1.00 |

| Group | N | Mood | | Mental health | | Total score | |
|---|---|---|---|---|---|---|---|
| | | Before treatment | After treatment | Before treatment | After treatment | Before treatment | After treatment |
| Control | 37 | 2.02 ± 0.73 | 3.28 ± 0.82 | 1.93 ± 0.65 | 2.69 ± 0.78 | 19.36 ± 3.99 | 29.25 ± 4.65 |
| Combination | 39 | 2.06 ± 0.77 | 3.78 ± 0.93 | 1.92 ± 0.68 | 3.80 ± 0.96 | 19.98 ± 4.04 | 36.55 ± 9.28 |

**表 4**　两组患者治疗前后 SF-12 量表之躯体功能评分的前后测量设计的方差分析表
**Table 4.**　ANOVA for pretest - posttest measurement design of physical function in SF-12 scale before and after treatment between 2 groups

| Source of variation | SS | df | MS | F value | P value |
|---|---|---|---|---|---|
| Treatment | 11.183 | 2 | 5.591 | 1.850 | 0.032 |
| Time | 34.506 | 1 | 34.506 | 69.463 | 0.000 |
| Treatment × time | 10.194 | 2 | 5.097 | 14.041 | 0.000 |
| Error between groups | 153.263 | 76 | 2.017 | | |
| Error within group | 21.181 | 76 | 0.279 | | |

**表 5**　两组患者治疗前后 SF-12 量表之躯体角色评分的前后测量设计的方差分析表
**Table 5.**　ANOVA for pretest - posttest measurement design of physical role in SF - 12 scale before and after treatment between 2 groups

| Source of variation | SS | df | MS | F value | P value |
|---|---|---|---|---|---|
| Treatment | 22.731 | 2 | 11.365 | 1.353 | 0.037 |
| Time | 254.545 | 1 | 254.545 | 143.579 | 0.000 |
| Treatment × time | 19.669 | 2 | 9.835 | 4.458 | 0.000 |
| Error between groups | 368.432 | 76 | 4.848 | | |
| Error within group | 67.758 | 76 | 0.892 | | |

**表 6**　两组患者治疗前后 SF-12 量表之疼痛评分的前后测量设计的方差分析表
**Table 6.**　ANOVA for pretest - posttest measurement design of pain in SF-12 before and after treatment between 2 groups

| Source of variation | SS | df | MS | F value | P value |
|---|---|---|---|---|---|
| Treatment | 38.373 | 2 | 19.186 | 2.158 | 0.028 |
| Time | 213.457 | 1 | 213.457 | 107.537 | 0.000 |
| Treatment × time | 50.689 | 2 | 25.345 | 12.262 | 0.000 |
| Error between groups | 360.243 | 76 | 4.740 | | |
| Error within group | 77.735 | 76 | 1.023 | | |

**表 7**　两组患者治疗前后 SF-12 量表之健康状况评分的前后测量设计的方差分析表
**Table 7.**　ANOVA for pretest - posttest measurement design of health status in SF - 12 scale before and after treatment between 2 groups

| Source of variation | SS | df | MS | F value | P value |
|---|---|---|---|---|---|
| Treatment | 31.289 | 2 | 15.645 | 15.315 | 0.024 |
| Time | 61.473 | 1 | 61.473 | 60.789 | 0.000 |
| Treatment × time | 44.684 | 2 | 22.342 | 22.743 | 0.000 |
| Error between groups | 521.210 | 76 | 6.858 | | |
| Error within group | 65.526 | 76 | 0.862 | | |

在紧密联系。由于腰神经具有较为特殊的解剖学结构而使其极易被牵拉或压迫,患者发生压缩性骨折时已损伤腰神经后支,从而导致腰部疼痛。传统治疗方法主要是腰神经后支阻滞术,可以使腰部疼痛完全缓解,然而这种方法虽然可以使疼痛症状完全消失,但却不能较好地解决腰神经易牵拉和压迫等问题。

Sluiter 于 1997 年首次提出"脉冲射频术"的概念并应用于临床[4]:采用 2 Hz、20 ms 的冲击式射频电流并控制电极最高温度 ≤ 42 ℃。脉冲射频术的镇痛作用机制目前尚不十分清楚。与传统射频热凝术不同,脉冲射频术是间断性射频电流,产生的温度 ≤ 42 ℃,对神经纤维的解剖学结构无破坏作用,仅使疼痛传导纤维失去活性,不引起肌力和感觉减退等并发症[5-7]。本研究结果显示,与治疗前相比,腰神经后支阻滞术组和腰神经后支脉冲射频术联合神经阻滞术组患者治疗后 VAS 和 ODI 评分降低、SF-12 量表 8 个维度(躯体功能、躯体角色、疼痛、

**表8** 两组患者治疗前后SF-12量表之活力评分的前后测量设计的方差分析表

**Table 8.** ANOVA for pretest - posttest measurement design of vitality score in SF - 12 scale before and after treatment between 2 groups

| Source of variation | SS | df | MS | F value | P value |
|---|---|---|---|---|---|
| Treatment | 16.496 | 2 | 8.248 | 2.726 | 0.035 |
| Time | 197.402 | 1 | 197.402 | 38.618 | 0.000 |
| Treatment × time | 12.877 | 2 | 6.439 | 23.705 | 0.000 |
| Error between groups | 371.697 | 76 | 4.891 | | |
| Error within group | 29.841 | 76 | 0.393 | | |

**表9** 两组患者治疗前后SF-12量表之社会功能评分的前后测量设计的方差分析表

**Table 9.** ANOVA for pretest - posttest measurement design of social function in SF - 12 before and after treatment between 2 groups

| Source of variation | SS | df | MS | F value | P value |
|---|---|---|---|---|---|
| Treatment | 17.610 | 2 | 8.805 | 0.046 | 0.047 |
| Time | 57.738 | 1 | 57.738 | 0.979 | 0.000 |
| Treatment × time | 9.255 | 2 | 4.628 | 0.865 | 0.000 |
| Error between groups | 60.033 | 76 | 0.789 | | |
| Error within group | 17.557 | 76 | 0.231 | | |

**表10** 两组患者治疗前后SF-12量表之情绪评分的前后测量设计的方差分析表

**Table 10.** ANOVA for pretest - posttest measurement design of mood score in SF - 12 scale before and after treatment between 2 groups

| Source of variation | SS | df | MS | F value | P value |
|---|---|---|---|---|---|
| Treatment | 38.013 | 2 | 19.006 | 8.105 | 0.038 |
| Time | 200.157 | 1 | 200.157 | 133.263 | 0.000 |
| Treatment × time | 26.894 | 2 | 13.447 | 17.157 | 0.000 |
| Error between groups | 250.736 | 76 | 3.299 | | |
| Error within group | 87.842 | 76 | 1.156 | | |

**表11** 两组患者治疗前后SF-12量表之心理卫生评分的前后测量设计的方差分析表

**Table 11.** ANOVA for pretest - posttest measurement design of mental health in SF - 12 before and after treatment between 2 groups

| Source of variation | SS | df | MS | F value | P value |
|---|---|---|---|---|---|
| Treatment | 29.815 | 2 | 14.908 | 2.526 | 0.026 |
| Time | 953.789 | 1 | 953.789 | 154.315 | 0.000 |
| Treatment × time | 27.473 | 2 | 13.737 | 44.921 | 0.000 |
| Error between groups | 828.684 | 76 | 10.904 | | |
| Error within group | 35.210 | 76 | 0.463 | | |

**表12** 两组患者治疗前后SF-12总评分的前后测量设计的方差分析表

**Table 12.** ANOVA for pretest - posttest measurement design of total score in SF - 12 scale before and after treatment between 2 groups

| Source of variation | SS | df | MS | F value | P value |
|---|---|---|---|---|---|
| Treatment | 17.955 | 2 | 8.978 | 1.170 | 0.029 |
| Time | 141.834 | 1 | 141.834 | 41.563 | 0.000 |
| Treatment × time | 19.938 | 2 | 9.969 | 57.961 | 0.000 |
| Error between groups | 47.101 | 76 | 0.619 | | |
| Error within group | 13.788 | 76 | 0.181 | | |

活质量。

综上所述，与腰神经后支阻滞术相比，腰神经后支脉冲射频术联合神经阻滞术治疗老年腰椎骨质疏松性椎体压缩骨折疼痛的临床疗效更显著，值得临床推广应用。

健康状况、活力、社会功能、情绪、心理卫生）评分和总评分升高，表明无论腰神经后支阻滞术还是腰神经后支脉冲射频术联合神经阻滞术均可以改善老年腰椎骨质疏松性椎体压缩骨折疼痛患者的疼痛程度、功能障碍程度和生活质量；与腰神经后支阻滞术组相比，腰神经后支脉冲射频术联合神经阻滞术组治疗后VAS和ODI评分降低、SF-12量表8个维度（躯体功能、躯体角色、疼痛、健康状况、活力、社会功能、情绪、心理卫生）评分和总评分升高，表明腰神经后支脉冲射频术联合神经阻滞术较腰神经后支阻滞术更显著改善老年腰椎骨质疏松性椎体压缩骨折疼痛患者的疼痛程度、功能障碍程度和生

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·临床医学图像·

# 继发于脑桥缺血性卒中的双侧小脑中脚Wallerian变性

## Bilateral Wallerian degeneration of middle cerebellar peduncles secondary to pontine infarction

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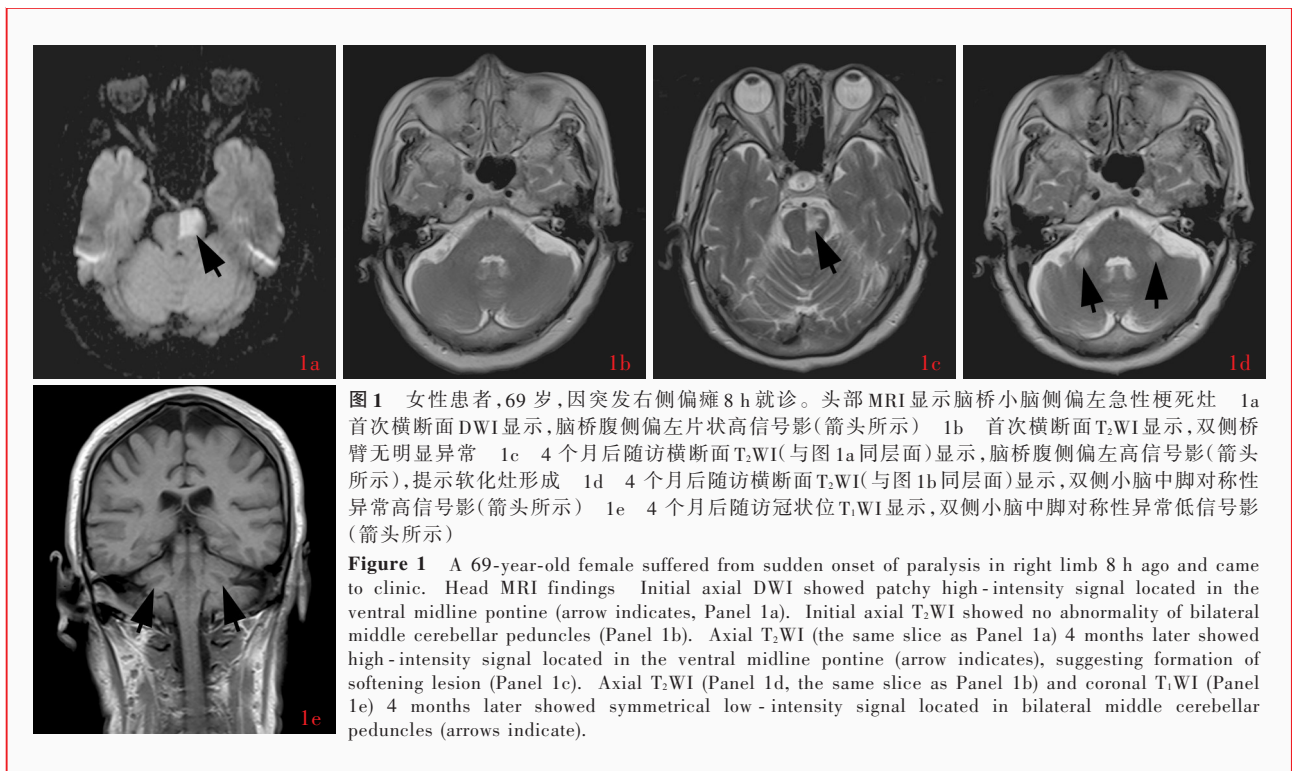


**图1**　女性患者，69岁，因突发右侧偏瘫8 h就诊。头部MRI显示脑桥小脑侧偏左急性梗死灶　1a 首次横断面DWI显示，脑桥腹侧偏左片状高信号影（箭头所示）　1b 首次横断面T₂WI显示，双侧桥臂无明显异常　1c 4个月后随访横断面T₂WI（与图1a同层面）显示，脑桥腹侧偏左高信号影（箭头所示），提示软化灶形成　1d 4个月后随访横断面T₂WI（与图1b同层面）显示，双侧小脑中脚对称性异常高信号影（箭头所示）　1e 4个月后随访冠状位T₁WI显示，双侧小脑中脚对称性异常低信号影（箭头所示）

**Figure 1**　A 69-year-old female suffered from sudden onset of paralysis in right limb 8 h ago and came to clinic. Head MRI findings　Initial axial DWI showed patchy high-intensity signal located in the ventral midline pontine (arrow indicates, Panel 1a). Initial axial T₂WI showed no abnormality of bilateral middle cerebellar peduncles (Panel 1b). Axial T₂WI (the same slice as Panel 1a) 4 months later showed high-intensity signal located in the ventral midline pontine (arrow indicates), suggesting formation of softening lesion (Panel 1c). Axial T₂WI (Panel 1d, the same slice as Panel 1b) and coronal T₁WI (Panel 1e) 4 months later showed symmetrical low-intensity signal located in bilateral middle cerebellar peduncles (arrows indicate).

　　Wallerian变性系轴索顺行性崩解及其所属髓鞘变性的过程，是继发于神经元胞体和近端轴索损伤的退行性变，最常累及皮质脊髓束和皮质脑桥束，累及脑桥-小脑通路者并不少见，但鲜为人所熟知。脑桥小脑束起源于对侧脑桥核（位于脑桥基底部），接受皮质脑桥束的传入，在脑桥上部水平交叉过中线，经小脑中脚达小脑皮质。当损害发生在一侧脑桥时，同侧脑桥核、对侧脑桥小脑束和来自对侧脑桥核穿过该处的纤维束同时受累，故继发于单侧脑干缺血性卒中的Wallerian变性常累及双侧桥臂。首次MRI检查可见脑桥腹侧急性梗死灶（图1a），而双侧小脑中脚正常（图1b）；发病1～3个月后可见脑桥基底部单侧软化灶形成（图1c），双侧小脑中脚外上部对称性Wallerain变性，T₂WI呈高信号，强度低于软化灶（图1d），T₁WI呈稍低均匀信号（图1e），DWI和ADC呈等或高信号。双侧小脑中脚Wallerian变性应注意与累及双侧桥臂的血管性病变（缺血性卒中）、感染（病毒感染）、脱髓鞘病变（脱髓鞘病、进行性播散性脑脊髓炎）、退行性变（多系统萎缩、脊髓小脑共济失调、Creutzfeldt-Jakob病），以及中毒性和代谢性疾病（毒品、低血糖脑病、肝豆状核变性、脑桥外中央髓鞘溶解）、自身免疫性疾病（免疫性脑炎，副肿瘤综合征）等相鉴别。首诊为脑桥中线旁病变的患者，随访时MRI出现对称性小脑中脚高信号，应考虑脑桥小脑束继发性Wallerian变性。