

· 临床研究 ·

3 种不同固定方式治疗桡骨远端 C 型骨折的疗效比较

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摘要 目的:比较 T 形锁定钢板内固定、T 形锁定钢板内固定联合外固定架外固定及万向双柱锁定钢板内固定治疗桡骨远端 C 型骨折的临床疗效。**方法:**回顾性分析 2008 年 1 月至 2015 年 1 月手术治疗的 100 例桡骨远端 C 型骨折患者的病例资料,男 43 例、女 57 例;年龄 20~75 岁,中位数 46 岁,左侧 48 例,右侧 52 例。采用 T 形锁定钢板内固定 35 例,采用 T 形锁定钢板内固定联合外固定架外固定 33 例,采用万向双柱锁定钢板内固定 32 例。对比 3 组患者的骨折愈合情况、患肢腕关节活动度(背伸、掌屈、桡偏、尺偏)、患侧手握力、掌倾角、尺偏角、桡骨短缩长度及采用腕关节功能(patient-rated wrist evaluation, PRWE)评分标准评价的腕关节功能。**结果:**100 例患者均获随访,随访时间 12~36 个月,中位数 24 个月;骨折均愈合,愈合时间 12~22 周,中位数 16 周。术后 12 个月,3 组腕关节活动度(背伸、掌屈、桡偏、尺偏)、患侧手握力(占健侧百分比)、掌倾角、尺偏角、桡骨短缩长度和 PRWE 评分的组间差异均有统计学意义[(58.3°±5.7°), (62.9°±6.6°), (63.6°±7.5°), $F=6.299, P=0.003$; (60.3°±6.8°), (68.1°±6.8°), (69.2°±7.7°), $F=6.635, P=0.002$; (16.3°±1.9°), (20.3°±2.4°), (19.8°±2.3°), $F=34.365, P=0.000$; (20.8°±2.7°), (23.4°±4.0°), (24.4°±2.6°), $F=11.605, P=0.000$; (70.4±2.7)%, (84.2±4.2)%, (84.3±4.3)%, $F=65.652, P=0.000$; (8.2°±1.8°), (9.9°±2.1°), (10.0°±1.8°), $F=10.120, P=0.000$; (13.7°±2.9°), (18.6°±3.6°), (19.8°±2.3°), $F=40.137, P=0.000$; (3.2±0.9)mm, (2.4±0.9)mm, (2.6±0.9)mm, $F=7.516, P=0.000$; (6.3±1.2)分, (8.0±0.9)分, (7.6±0.9)分, $F=27.196, P=0.000$]。与 T 形锁定钢板联合外固定支架组和万向双柱锁定钢板组相比, T 形锁定钢板组腕关节活动度和患侧手握力较差、掌倾角和尺偏角较小、桡骨短缩程度较大、PRWE 评分均较低($P=0.005, P=0.007, P=0.000, P=0.001, P=0.000, P=0.000, P=0.000, P=0.000, P=0.002, P=0.001, P=0.000, P=0.000, P=0.000, P=0.000, P=0.000, P=0.006$);而万向双柱锁定钢板组与 T 形锁定钢板联合外固定支架组比较,各指标的组间差异均无统计学意义($P=0.691, P=0.513, P=0.401, P=0.202, P=0.922, P=0.114, P=0.897, P=0.105, P=0.388$)。**结论:**与 T 形锁定钢板内固定相比, T 形锁定钢板内固定联合外固定架外固定和万向双柱锁定钢板内固定治疗桡骨远端 C 型骨折,能更好地维持骨折端的稳定,更有利于腕关节功能的恢复。

关键词 桡骨骨折;桡腕关节;骨折固定术

A clinical comparison of three kinds of fixation for treatment of type C distal radius fractures

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ABSTRACT Objective: To compare the clinical curative effects of T – shape locking plate internal fixation versus T – shape locking plate internal fixation combined with external fixator external fixation versus universal double rods locking plate internal fixation in treatment of type C distal radius fractures. **Methods:** The medical records of 100 patients with type C distal radius fractures who received surgery from January 2008 to January 2015 were analyzed retrospectively. The patients consisted of 43 males and 57 females, and ranged in age from 20 to 75 years(Median =46 yrs). The fractures located in left radius for 48 patients and right radius for 52 patients. Thirty-five patients were treated with T – shape locking plate internal fixation(group A), and 33 patients were treated with T – shape locking plate internal fixation combined with external fixator external fixation(group B), while 32 patients were treated with universal double rods locking plate internal fixation(group C). The fracture healing, range of motion(ROM) of wrist(dorsal expansion, palmar flexion, radial deviation and ulnar deviation), hand grip strength of affected side, volar tilt angles, radial inclination angles, radial shortening length and wrist function were compared between the 3 groups. The wrist function were evaluated by using patient – rated wrist evaluation(PRWE) scoring standard. **Results:** All patients in the 3 groups were followed up for 12 – 36 months with a median of 24 months and all fractures healed for 12 – 22 weeks with a median of 16 weeks. There was statistical difference in wrist ROM(dorsal expansion, palmar flexion, radial deviation and ulnar deviation) .

hand grip strength of affected side, volar tilt angles, radial inclination angles, radial shortening length and PRWE scores between the 3 groups at 12 months after surgery (58.3 \pm 5.7, 62.9 \pm 6.6, 63.6 \pm 7.5 degrees, $F=6.299$, $P=0.003$; 60.3 \pm 6.8, 68.1 \pm 6.8, 69.2 \pm 7.7 degrees, $F=6.635$, $P=0.002$; 16.3 \pm 1.9, 20.3 \pm 2.4, 19.8 \pm 2.3 degrees, $F=34.365$, $P=0.000$; 20.8 \pm 2.7, 23.4 \pm 4.0, 24.4 \pm 2.6 degrees, $F=11.605$, $P=0.000$; 70.4 \pm 2.7, 84.2 \pm 4.2, 84.3 \pm 4.3 %, $F=65.652$, $P=0.000$; 8.2 \pm 1.8, 9.9 \pm 2.1, 10.0 \pm 1.8 degrees, $F=10.120$, $P=0.000$; 13.7 \pm 2.9, 18.6 \pm 3.6, 19.8 \pm 2.3 degrees, $F=40.137$, $P=0.000$; 3.2 \pm 0.9, 2.4 \pm 0.9, 2.6 \pm 0.9 mm, $F=7.516$, $P=0.000$; 6.3 \pm 1.2, 8.0 \pm 0.9, 7.6 \pm 0.9 points, $F=27.196$, $P=0.000$). The wrist ROM, hand grip strength of affected side, volar tilt angles and radial inclination angles were smaller, and the radial shortening degrees were larger and PRWE scores were lower in group A compared to group B and group C ($P=0.005$, $P=0.007$, $P=0.000$, $P=0.001$, $P=0.000$, $P=0.000$, $P=0.000$, $P=0.000$, $P=0.000$, $P=0.000$, $P=0.002$, $P=0.001$, $P=0.000$, $P=0.000$, $P=0.000$, $P=0.000$, $P=0.000$, $P=0.000$, $P=0.006$). There was no statistical difference in all indexes between group B and group C ($P=0.691$, $P=0.513$, $P=0.401$, $P=0.202$, $P=0.922$, $P=0.114$, $P=0.897$, $P=0.105$, $P=0.388$). **Conclusion:** T-shape locking plate internal fixation combined with external fixator external fixation and universal double rods locking plate internal fixation can better maintain the stability of broken ends of fractured bone and be more conducive to the recovery of wrist function compared to T-shape locking plate internal fixation in the treatment of type C distal radius fractures.

Key words radius fractures; wrist joint; fracture fixation

桡骨远端 C 型骨折是复杂的关节内骨折,属于不稳定型骨折,多需手术治疗。桡骨远端 C 型骨折手术治疗方法很多,目的均是恢复原有解剖关系、维持骨折复位和早期功能锻炼^[1]。笔者回顾性分析 2008 年 1 月至 2015 年 1 月分别采用 T 形锁定钢板内固定、T 形锁定钢板内固定联合外固定架外固定及万向双柱锁定钢板内固定 3 种方法手术治疗的 100 例桡骨远端 C 型骨折患者的病例资料,对 3 种方法的临床疗效进行了比较,现报告如下。

1 临床资料

1.1 一般资料 桡骨远端骨折患者 100 例,男 43 例、女 57 例;年龄 20~75 岁,中位数 46 岁;左侧 48 例,右侧 52 例。均为在河南大学淮河医院住院治疗的患者。致伤原因:车祸伤 31 例,摔伤 53 例,高处坠落伤 16 例。采用 T 形锁定钢板内固定 35 例,采用 T 形锁定钢板内固定联合外固定架外固定 33 例,采用万向双柱锁定钢板内固定 32 例。3 组间性别、年龄和致伤原因等基线资料比较差异无统计学意义,具有可比性(表 1)。

表 1 3 组桡骨远端 C 型骨折患者基线资料比较

组别	例数	性别(例)		年龄 ($\bar{x} \pm s$, 岁)	致伤原因(例)		
		男	女		车祸伤	摔伤	高处坠落伤
T 形锁定钢板组	35	15	20	46.94 \pm 13.63	11	18	6
T 形锁定钢板联合外固定支架组	33	14	19	46.27 \pm 15.57	10	18	5
万向双柱锁定钢板组	32	14	18	45.41 \pm 14.42	10	17	5
检验统计量		$\chi^2=0.012$		$t=0.094$	$\chi^2=0.085$		
P 值		0.994		0.911	0.999		

1.2 诊断标准 桡骨干皮质骨向松质骨移行部以远、距桡腕关节面 2~3 cm 的松质骨骨折^{[2]422}。

1.3 纳入标准 ①符合上述诊断标准;②具有明确的外伤史;③受伤至手术时间 ≤ 2 周;④骨折 AO 分型 C 型^{[2]423}。

1.4 排除标准 ①陈旧性骨折者;②病理性骨折者;③开放性骨折者;④合并严重的神经、血管损伤者;⑤合并其他部位骨折或脱位者。

2 方法

2.1 手术方法

2.1.1 T 形锁定钢板内固定 采用臂丛神经阻滞麻

醉,患者平卧位,患肢外展,在前臂桡动脉和桡侧腕屈肌腱间作一约 8 cm 长切口,成“V”形延长至腕横纹,打开桡侧腕屈肌腱鞘,切开前臂深筋膜显露拇长屈肌。部分游离拇长屈肌肌腹并将其拨向尺侧以完全显露旋前方肌。沿桡骨桡侧“L”形切开骨膜至桡骨茎突,骨膜下剥离旋前方肌,显露骨折端。清除骨折端瘀血块及软组织后,牵引、撬拨复位骨折端,恢复桡骨高度及掌倾角,克氏针临时固定,骨质缺损区植入人工诱导骨活性材料,植入钢板,钢板滑动孔先拧入 1 枚螺钉以便调整位置,C 形臂 X 线机透视下确认钢板位置良好、关节面复位良好后,拧入钢板远、近端锁

形锁定钢板固定桡骨远端骨折形成的不是各方向均稳定的坚强同定系统,对于骨折块细小、远端不能拧入螺钉者,术后骨折仍有移位的可能。且桡骨远端骨折时,单纯钢板固定不能抵抗肌腱收缩、关节挛缩的作用力,难以有效维持腕关节的关节间隙及高度,导

致关节囊挛缩、关节僵硬。而 T 形锁定钢板内固定联合外固定架外固定较单纯 T 形锁定钢板内固定可更

好地维持腕关节的稳定性。

张宇轩等^[14]对万向双柱锁定钢板与 T 形锁定钢



(1)术前X线正侧位片



(2)术后1周X线正侧位片



(3)术后3个月X线正侧位片

图 1 T 形锁定钢板内固定治疗桡骨远端 C 型骨折手术前后图片

患者,女,62 岁,右侧桡骨远端 C 型骨折,行 T 形锁定钢板内固定手术治疗



(1)术前CT片



(2)术后1周X线正侧位片



(3)术后3个月X线正侧位片

图 2 T 形锁定钢板内固定联合外固定支架外固定治疗桡骨远端 C 型骨折手术前后图片

患者,男,46 岁,左侧桡骨远端 C 型骨折,行 T 形锁定钢板内固定联合外固定支架外固定手术治疗



(1)术前CT片



(2)术后1周X线正侧位片



(3)术后8个月X线正侧位片

图 3 万向双柱锁定钢板内固定治疗桡骨远端 C 型骨折手术前后图片

患者,女,71 岁,右侧桡骨远端 C 型骨折,行万向双柱锁定钢板内固定手术治疗

板治疗桡骨远端骨折的疗效进行了比较,发现 2 种方法均可较好地恢复患者腕关节功能,疗效相当。但也有学者^[15-16]认为万向双柱锁定钢板内固定治疗桡骨远端骨折的疗效优于 T 形锁定钢板内固定,且与 T 形锁定钢板相比具有以下优点:①万向双柱锁定钢板配有锁钉衬套,允许螺钉从多个角度植入,提高了钢板抗变形的能力,使内固定更加牢固,更有利于维持骨折端的稳定。②万向双柱锁定钢板允许螺钉从 15° 以内的不同方向固定,并可调整螺钉植入的角度,可抓持移位的骨块。③万向双柱锁定钢板与桡骨的解剖结构完全符合,无须进行预弯,对骨膜的损伤较小。④万向双柱锁定钢板边缘的切迹更小,对周围组织的激惹小。⑤万向双柱锁定钢板可用于桡骨远端外侧柱、中间柱及关节面之间的固定,固定更加稳定。本研究结果显示应用万向双柱锁定钢板治疗桡骨远端 C 型骨折疗效优于单纯 T 形锁定钢板内固定,原因可能是桡骨远端 C 型骨折为不稳定性骨折,双柱钢板的双柱设计可更好地维持桡侧柱和中间柱的稳定,钢板远端可打入两排锁定螺钉,能更好地发挥“栅栏”作用,减少术后掌倾角、尺偏角、桡骨高度的丢失。

本研究结果表明,与 T 形锁定钢板内固定相比,T 形锁定钢板内固定联合外固定架外固定和万向双柱锁定钢板内固定治疗桡骨远端 C 型骨折,能更好地维持骨折端的稳定,更有利于腕关节功能的恢复。

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