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## · 临床研究 ·

## 桡骨远端“T”形钢板结合缝合锚钉治疗 Neer II b 型锁骨远端骨折

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**【摘要】** 目的: 比较桡骨远端“T”形钢板结合缝合锚钉与锁骨远端解剖锁定钢板联合缝合锚钉治疗 Neer II b 型锁骨远端骨折的临床疗效。方法: 回顾分析自 2014 年 6 月至 2018 年 6 月收治 42 例 Neer II b 型锁骨远端骨折患者的临床资料, 根据手术方式的不同, 分为桡骨远端“T”形钢板结合缝合锚钉组(观察组)及锁骨远端解剖锁定钢板联合缝合锚钉(对照组)。其中观察组 22 例, 男 13 例, 女 9 例; 年龄 22~70(45.78±14.44)岁; 左侧 12 例, 右侧 10 例; 车祸伤 8 例, 摔倒 14 例。对照组 20 例中, 男 12 例, 女 8 例; 年龄 24~66(44.17±15.58)岁; 左侧 13 例, 右侧 7 例; 车祸伤 6 例, 摔倒 14 例。比较两组患者手术时间、术中出血量、骨折愈合时间, 并采用 Constant-Murley 评分评定肩关节功能。结果: 两组患者术后均获得随访, 时间 18~24(20.96±2.02)个月, 两组患者术后切口均 I 期愈合, 末次随访时两组病例骨折端均骨性愈合。两组患者在手术时间、术中出血量、骨折愈合时间方面比较差异均无统计学意义( $P>0.05$ ); 术后 3 个月两组肩关节功能比较差异无统计学意义( $P>0.05$ )。结论: 两种方法治疗 Neer II b 型锁骨远端骨折均可获得满意的疗效, 尤其适用于锁骨远端粉碎性骨折或骨质疏松患者; 应用桡骨远端“T”形钢板结合缝合锚钉治疗 Neer II b 型锁骨远端骨折临床效果满意, 给临床提供了另外一种可行的治疗方案。

**【关键词】** 锁骨; 骨折; 骨折固定术, 内  
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**Case-control study on T-plate combined with suture anchors for the treatment of Neer II b clavicle fractures** WANG Jin, WANG Zhi-xu, LI Zi-cai, PU Yan-chuan, WANG Hu-lin, MIAO Sheng-long, BI Hu, WANG Dong, XU Dong-lin, and XU Zhi-bin. Department of Orthopaedics, Wuwei People's Hospital, Wuwei 733000, Gansu, China

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**ABSTRACT Objective:** To compare the clinical efficacy of distal radius T-plate combined with suture anchor and distal clavicle anatomical locking plate combined with suture anchor in the treatment of Neer II b distal clavicle fracture. **Methods:** From June 2014 to June 2018, 42 patients with Neer II b distal clavicle fractures were retrospectively analyzed. According to different surgical methods, they were divided into the observation group (T-shaped plate combined with suture anchor) and the control group (anatomical locking plate combined with suture anchor). There were 22 patients in the observation group and 20 patients in the control group. In the observation group, there were 13 males and 9 females, aged from 22 to 70 ( $45.78 \pm 14.44$ ) years old, 12 cases on the left side and 10 cases on the right side, 8 cases of traffic accident injury and 14 cases of fall. In the control group, there were 12 males and 8 females, aged from 24 to 66 ( $44.17 \pm 15.58$ ) years, 13 cases on the left side and 7 cases on the right side, 6 cases of traffic accident injury and 14 cases of fall. The operation time, intraoperative blood loss and fracture healing time were compared between the two groups, and Constant Murley score was used to evaluate shoulder joint function. **Results:** The patients in both groups were followed up for 18 to 24 ( $20.96 \pm 2.02$ ) months. The incisions of both groups were healed at stage I. The fracture ends of both groups were bony healed at the last follow-up. There was no significant difference in operation time, intraoperative blood loss and fracture healing time between two groups ( $P > 0.05$ ); there was no significant difference in shoulder joint function between two groups at 3 months after operation ( $P > 0.05$ ). **Conclusion:** The two methods can obtain satisfactory results in the treatment of Neer II b distal clavicle fractures, especially suitable for patients with comminuted distal clavicle fractures or osteoporosis; the clinical effect of the treatment of Neer II b distal clavicle fractures with T-type distal radius plate combined with suture anchor is satisfactory, which provides another feasible treatment scheme for clinic.

**KEYWORDS** Clavicle; Fractures; Fracture fixation, internal

锁骨远端骨折在临床上比较常见, 约占全部锁骨骨折的 15%~30%<sup>[1]</sup>, Neer<sup>[2]</sup>根据骨折线的部位, 锥状韧带的损伤情况, 将锁骨远端骨折分为 5 种类型, 常见的有 I、II、III 型, 其中 I、III 型属于稳定型骨折, 大部分可以保守治疗; II 型由于锥状韧带断裂, 在上肢重力作用及胸大肌、胸小肌、胸锁乳突肌的牵拉作用下, 使骨折近端向上翘起, 属于不稳定骨折; 保守治疗失败率较高, 手术治疗目前已成为共识。早期大多数使用锁骨钩钢板治疗, 但并发症较多, 临床效果不满意; 随着对喙锁韧带研究的深入, 发现锥状韧带具有限制锁骨向上移位的作用<sup>[3]</sup>, 修复锥状韧带可为骨折断端提供相对稳定性。国外学者<sup>[4]</sup>采用桡骨远端“T”形钢板结合缝合锚钉治疗 Neer II b 型锁骨远端骨折 8 例, 术后肩关节 Constant-Murley 评分为 93.3 分, 取得了良好的临床效果; 国内学者张玉富等<sup>[5]</sup>采用锁骨远端解剖锁定钢板联合缝合锚钉治疗 Neer II b 型锁骨远端骨折, 发现术后可获得良好的肩关节功能和更小的喙锁间距离, 但对于采用上述两种方法治疗 Neer II b 型锁骨远端骨折的疗效对比研究临床未见报道较少, 本文回顾分析 2014 年 6 月至 2018 年 6 月采用上述两种方法治疗 Neer II b 型锁骨远端骨折 42 例患者的临床资料, 报告如下。

## 1 资料与方法

### 1.1 病例选择

纳入标准: (1) 单纯急性单侧锁骨远端骨折, 根据 X 线片诊断为 Neer II b 型。(2) 年龄 > 18 岁。(3) 术前无肩部外伤史, 肩关节功能正常。(4) 随访 12 个月以上。排除标准: (1) 陈旧锁骨远端 Neer II b 型骨折。(2) 开放性锁骨远端 Neer II b 型骨折, 或者合并血管

神经损伤。(3) 既往锁骨远端骨折病史, 肩关节功能受限。(4) 锁骨远端病理性骨折。

### 1.2 临床资料

自 2014 年 6 月至 2018 年 6 月共有 42 例患者符合上述标准, 纳入本研究。按手术方案的不同分为桡骨远端“T”形钢板结合缝合锚钉组(观察组)及锁骨远端解剖锁定钢板联合缝合锚钉(对照组), 其中观察组 22 例, 男 13 例, 女 9 例; 年龄 22~70 ( $45.78 \pm 14.44$ ) 岁; 左侧 12 例, 右侧 10 例; 车祸伤 8 例, 摔倒 14 例。对照组 20 例, 男 12 例, 女 8 例; 年龄 24~66 ( $44.17 \pm 15.58$ ) 岁; 左侧 13 例, 右侧 7 例; 车祸伤 6 例, 摔倒 14 例。两组患者在性别、年龄、受伤原因、骨折部位等一般资料比较无统计学差异 ( $P > 0.05$ )。见表 1。

### 1.3 治疗方法

**1.3.1 对照组** 患者麻醉成功后, 取仰卧位, 患侧肩部垫起, 沿锁骨上方皮肤 Langer 线做横切口, 长约 10 cm, 依次切开皮肤及皮下组织, 剥离附着肌肉, 沿锁骨长轴切开骨膜, 显露骨折断端及锁骨远端, 注意保护肩锁关节。清理骨折断端积血, 用复位钳复位, 克氏针临时固定, 选用合适长度“T”形钢板放置于锁骨上方, 复位钳将钢板固定于锁骨上方, 依次钻孔后选择合适长度 5~6 枚螺钉固定, 一般近端 2~3 枚螺钉, 骨折远端 3 枚螺钉; 拔除克氏针, 随后钝性分离三角肌, 显露喙突, 将缝合锚钉 (4 mm Con-Med 公司 美国) 固定于喙突基底部, 在喙突上方钢板孔钻孔后穿过缝合锚钉尾线, 打结固定, 冲洗伤口, 清点敷料及器械无误后逐层缝合伤口。

**1.3.2 观察组** 手术方法与对照组相同, 钢板选用

表 1 两组 Neer II b 型锁骨远端骨折患者术前一般资料比较

Tab.1 Comparison of preoperative general data of patients with Neer II b distal clavicle fractures between two groups

组别	例数	性别(例)		年龄( $\bar{x}\pm s$ ,岁)	侧别(例)		受伤原因(例)		受伤至受伤时间( $\bar{x}\pm s$ ,d)
		男	女		左	右	车祸伤	摔倒	
观察组	22	13	9	45.78±14.44	12	10	8	14	5.16±2.32
对照组	20	12	8	44.17±15.58	13	7	6	14	5.38±2.08
检验值		$\chi^2=0.004$		$t=0.322$	$\chi^2=0.475$		$\chi^2=0.191$		$t=0.387$
P 值		0.952		0.75	0.471		0.662		0.742

锁骨远端解剖锁定钢板,近端固定 2~3 枚螺钉,远端可多平面固定 3~4 枚螺钉。

**1.3.3 术后处理** 后常规给予镇痛、消肿、预防切口感染治疗,抗生素一般 24 h 内停药。术后第 1~3 天开始肘关节及腕关节功能锻炼,术后第 4 天开始肩关节主动及被动屈曲和外展活动;术后 4 周开始肩关节前屈、后伸、外展、内收全方位活动,12 周根据骨折愈合情况进行对抗性功能锻炼。

**1.4 观察项目与方法**

观察比较两组患者伤口愈合情况、手术时间、术中出血量及骨折愈合时间;术后 3 个月时采用 Constant-Murley 评分<sup>[6]</sup>对患侧肩关节进行评价,包括活动度 40 分,肌力 25 分,功能 20 分,疼痛 15 分,总分 100 分。

**1.5 统计学处理**

采用 SPSS 16.0 软件行统计学分析。定量资料以均数±标准差( $\bar{x}\pm s$ )表示,分别采用独立样本  $t$  检验、配对  $t$  检验,定性资料比较采用  $\chi^2$  检验;等级资料采用秩和检验。以  $P<0.05$  为差异有统计学意义。

**2 结果**

两组患者术后均获得随访,时间 18~24(20.96±2.02)个月。两组 42 例患者术后切口均 I 期愈合,末次随访时两组病例骨折端均骨性愈合。根据统计结果,两组患者在手术时间、术中出血量、骨折愈合时间方面比较,差异均无统计学意义( $P>0.05$ ),见表 2。术后 3 个月观察组与对照组肩关节功能 Constant-Murley 评分比较差异无统计学意义( $P>0.05$ ),见表 3。结果说明桡骨远端“T”形钢板结合缝合锚钉

与锁骨远端解剖锁定钢板联合缝合锚钉治疗 Neer II b 型锁骨远端骨折疗效相当。

表 2 两组锁骨远端骨折患者术后一般观察指标比较( $\bar{x}\pm s$ )

Tab.2 Comparison of general observation indexes between two groups of patients with distal clavicle fracture after operation( $\bar{x}\pm s$ )

组别	例数	手术时间(min)	术中出血量(ml)	骨折愈合时间(周)
观察组	22	55.50±13.73	52.14±14.62	11.16±2.76
对照组	20	51.95±11.74	55.25±13.25	11.95±3.28
$t$ 值		0.896	0.721	0.847
P 值		0.376	0.475	0.401

**3 讨论**

对于 Neer II b 型锁骨远端骨折,手术治疗在临床上已经达成一致,以往由于内固定材料的缺乏,对锁骨远端骨折主要采用张力带、克氏针、锁骨钩钢板等方式固定<sup>[7]</sup>。但大部分无法达到坚强的固定,克氏针、张力带常常需要固定肩锁关节,影响肩关节活动,且克氏针尾端残留皮肤外面,容易引起针道感染、松动后克氏针退出等问题;锁骨钩钢板安置简单,固定坚强,但是由于它是通过杠杆原理复位固定,钢板远端长期肩峰下磨损,术后肩关节周围疼痛,肩关节活动受限等并发症发生较高<sup>[8]</sup>,国外学者统计发生率在 30%左右<sup>[9]</sup>,临床满意率不高。

近年来有学者<sup>[10-11]</sup>采用桡骨远端“T”形钢板治

表 3 两组锁骨远端骨折患者术后 3 个月 Constant-Murley 评分比较( $\bar{x}\pm s$ ,分)

Tab.3 Comparison of Constant Murley score of patients with distal clavicle fractures between two groups at 3 months after operation( $\bar{x}\pm s$ , score)

组别	例数	疼痛	功能	活动度	肌力	总分
观察组	22	12.23±2.47	17.14±2.14	35.68±2.97	22.36±2.17	88.05±4.46
对照组	20	11.85±1.95	18.10±1.55	35.96±3.10	21.80±2.35	87.70±4.51
$t$ 值		0.546	1.653	0.286	0.807	0.250
P 值		0.588	0.106	0.776	0.424	0.804

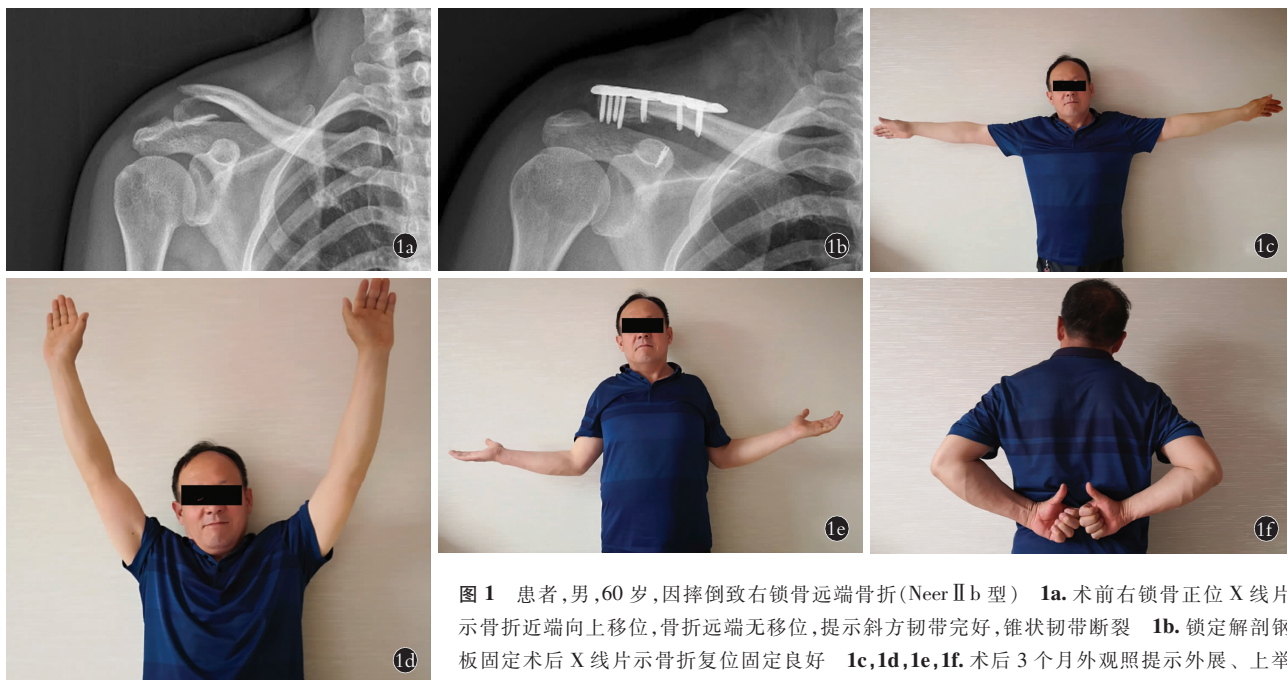


图 1 患者,男,60岁,因摔倒致右锁骨远端骨折(Neer II b型) 1a. 术前右锁骨正位 X 线片示骨折近端向上移位,骨折远端无移位,提示斜方韧带完好,锥状韧带断裂 1b. 锁定解剖钢板固定术后 X 线片示骨折复位固定良好 1c,1d,1e,1f. 术后 3 个月外观照提示外展、上举及内外旋功能良好

**Fig.1** A 60-year-old male patient suffered from distal clavicle fracture due to fall (Neer II b) 1a. Preoperative AP X-ray film of the right clavicle showed that the proximal part of the fracture was displaced upward, but the distal part of the fracture was not displaced, indicating that the trapezoid ligament was intact and the conical ligament was broken 1b. Postoperative X-ray showed that the fracture was well reduced and fixed 1c, 1d, 1e, 1f. Three months after operation, the appearance showed that abduction, lifting and internal and external rotation were good



图 2 患者,女,58岁,因车祸致左锁骨远端骨折(Neer II b型) 2a. 术前左锁骨正位 X 线片示骨折近端向上移位,骨折远端无移位,提示斜方韧带完好,锥状韧带断裂 2b. 术中“T”形钢板放置后照片 2c. “T”形锁定钢板固定术后 X 线片示骨折复位固定良好 2d, 2e, 2f. 术后 3 个月外观照提示外展、上举及内外旋功能良好

**Fig.2** A 58-year-old woman suffered from distal clavicle fracture (Neer II b) due to traffic accident 2a. Preoperative X-ray film of left clavicle showed that the proximal end of the fracture was displaced upward, while the distal end of the fracture was not displaced, indicating that the trapezoidal ligament was intact and the conical ligament was broken 2b. Photos of intraoperative T-plate placement 2c. Postoperative X-ray showed that the fracture was well reduced and fixed 2d, 2e, 2f. Three months after operation, the appearance showed that abduction, lifting and internal and external rotation were good

疗锁骨远端 Neer II b 型骨折, 以及锁骨远端解剖锁定钢板的出现, 对于锁骨远端骨折均取得不错的临

床疗效。由于它不累及肩锁关节及肩峰下间隙, 不会对肩峰产生持续向上的应力, 引起肩关节周围疼痛

及活动受限,避免了锁骨钩钢板引起的很多并发症;同时远端有多枚螺钉固定,可提供稳定的固定。但国内多位学者研究认为<sup>[5,12]</sup>锁骨远端锁定钢板只能提供水平位的稳定性,不能提供垂直方向的稳定性,当锁骨远端粉碎性骨折时,出现固定不牢固,可能造成骨折延迟愈合或内固定松动移位,导致内固定失败。

国外学者 Nandra 等<sup>[13]</sup>采用锁骨远端解剖钢板结合喙锁韧带重建治疗不稳定锁骨远端骨折,效果满意,未出现内固定失效或者骨折不愈合。国内林三福等<sup>[14]</sup>采用锁骨远端解剖钢板结合锚钉重建喙锁韧带治疗锁骨远端 Neer II b 型骨折 33 例,均取得满意的疗效,并发症发生率明显低于锁骨钩钢板固定患者。由于锥状韧带可为骨折断端提供垂直方向的稳定性,目前大多数学者<sup>[15]</sup>还是主张重建喙锁韧带,尤其对于锁骨远端粉碎性骨折或者老年骨质疏松患者,通过钢板无法获得坚强固定,可通过重建喙锁韧带,重建垂直位的稳定性,减轻钢板螺钉与骨面之间的应力,可避免锁骨远端松动、退钉的发生风险,是一种钢板固定的有效辅助手段。结合本组 42 例病例中,都重建喙锁韧带,均未发生内固定失败,骨折不愈合。

笔者选用桡骨远端“T”形钢板结合带线锚钉治疗锁骨远端 Neer II b 型骨折 22 例,与对照组比较均取得满意的临床疗效,在术中出血、手术时间、骨折愈合时间、术后肩关节功能评分等方面与对照组比较,均无明显的差异( $P < 0.05$ ),两种内固定材料对锁骨远端骨折均可获得满意的疗效,尤其适用于锁骨远端粉碎性骨折,骨块较小;或者老年骨质疏松患者。总之,应用桡骨远端“T”形钢板结合缝合锚钉治疗 Neer II b 型锁骨远端骨折给临床提供了另外一种可行的治疗方案。

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