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指掌骨骨折合并软组织损伤的微型锁定钢板皮外固定应用效果 及对关节活动度的影响*

万 乐¹ 王善正² 张海翔² 陈翔淑² 郭玉冬²

(1 联勤保障部队第 904 医院骨科 江苏 无锡 241044; 2 东南大学附属中大医院骨科 江苏 南京 210009)

摘要 目的:探讨指掌骨骨折合并软组织损伤的微型锁定钢板皮外固定的应用效果及对关节活动度的影响。**方法:**选取我院 2015 年 7 月到 2020 年 7 月共收治的 80 例指掌骨骨折合并软组织损伤的患者作为研究对象, 将其随机分为观察组与对照组, 各 40 例。对照组应用克氏针、微型螺钉、肌腱缝线或拉力螺钉进行内固定, 观察组在对照组基础上联合应用微型锁定钢板皮外固定, 并针对患者合并软组织损伤情况应用石膏外固定。对比两组患者的骨折愈合时间、围术期指标、Jamar 握力、TAM、DASH 评分、术后不良反应情况以及生活质量。**结果:**观察组手术时间高于对照组, 骨折愈合时间和住院时间较对照组低($P<0.05$); 观察组患者的 DASH 评分明显低于对照组, TAM 与 Jamar 握力明显高于对照组($P<0.05$); 观察组术后并发症发生率较对照组低($P<0.05$); 术后 1 个月两组患者生活质量评分均升高, 高于对照组($P<0.05$)。**结论:**对指掌骨骨折合并软组织损伤的患者在常规克氏针内固定的基础上, 应用微型锁定钢板皮外固定, 再进行石膏固定, 手术步骤、手术时间虽增加, 但更有利于患者术后骨折愈合, 减少术后并发症的发生, 减少住院时间, 促进患者出院后关节功能恢复, 提高生活质量, 值得临床应用推广。

关键词:指掌骨骨折; 软组织损伤; 微型锁定钢板; 皮外固定; 关节活动度

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Application Effect of Mini Lockin Plate External Fixation for Metacarpal Fracture with Soft Tissue Injury and Its Influence on Joint Range of Motion*

WAN Le¹, WANG Shan-zheng², ZHANG Hai-xiang², CHEN Xiang-shu², GUO Yu-dong²

(1 Orthopedics Department, 904th Hospital of the Joint Service Support Force of the Chinese people's liberation Army, Wuxi, Jiangsu, 214044, China; 2 Orthopedics Department, ZhongDa Hospital Southeast University, Nanjing, Jiangsu, 210009, China)

ABSTRACT Objective: To investigate the application effect of mini locking plate for external fixation of metacarpal fractures with soft tissue injury and its influence on the range of motion of joints. **Methods:** 80 cases with metacarpal fracture combined with soft tissue injury in our hospital from July 2015 to July 2020 were selected as the research object, and the patients were randomly divided into the observation group and control group, 40 cases in each group. The patients in the control group were treated with Kirschner wire, micro screw, tendon suture or lag screw for internal fixation, while the patients in the observation group were treated with micro locking plate combined with external fixation on the basis of the control group, and plaster external fixation was applied for patients with soft tissue injury. The fracture healing time and perioperative indicators of the two groups were compared. The Jamar grip strength scores, TAM and dash in two groups were compared. The postoperative adverse reactions and quality of life of the two groups were compared. **Results:** The operation time in the observation group was significantly higher than that of the control group, the healing time and hospitalization time of the fracture were significantly lower than that of the control group($P<0.05$). The DASH score in the observation group was significantly lower than that of control group, and the grip strength of TAM and Jamar was significantly higher than that of control group($P<0.05$). The incidence of postoperative complications in the observation group was lower than that of the control group ($P<0.05$). The quality of life score of the two groups was increased one month after operation, and the mental health, emotional function, social function, vitality, physiological function of the observation group were higher. The physiological function and overall health were significantly higher than that of the control group ($P<0.05$). **Conclusion:** On the basis of conventional Kirschner wire internal fixation, micro locking plate external fixation combined with plaster fixation can increase the operation steps and operation time, while was more conducive to the fracture healing, reduce the occurrence of adverse reactions, reduce the length of hospital stay, and promote the recovery of joint function after discharge. It is worthy of clinical application and promotion to improve the quality of life.

Key words: Metacarpal fracture; Soft tissue injury; Mini locking plate; External fixation; Range of motion

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作者简介:万乐(1989-),男,本科,主治医师,研究方向:骨科相关疾病, E-mail: Wanle202106@163.com

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前言

指掌骨骨折一般是由暴力或者外伤所导致,多发生于青壮年男性^[1]。由于指掌骨解剖学结构比较特殊、复杂,因此在骨折后,骨折处易发生错位,且伴有较为严重的肿胀和疼痛^[2]。指掌骨骨折的发生率约为上肢骨折的 7.5%^[3]。当患者骨折较为复杂时,复位治疗无法进行,多采用手术进行治疗。手部是人体活动最大的一个部位,骨折之后,若不能及时治疗,极可能出现畸形愈合或者关节僵硬现象,对患者的预后和功能恢复产生很大影响。相关研究显示^[4,5],指掌骨骨折的患者有 80% 的几率伴随局部软组织损伤现象,甚至是缺损,因此对于指掌骨骨折的治疗一直是临床上的难点。当前,对于指掌骨骨折的处理方法较多,例如外固定支架、可吸收棒、记忆合金环抱器、细钢丝以及克氏针内固定等,但这些方法不仅缺乏稳定性,且固定时间也较长,对患者手部早期活动产生不利影响,进而影响患者的关节活动度。有国外研究发现^[6,7],微型锁定钢板对于骨折的固定上具有重要价值,能提升固定性能,治疗效果显著。因此本文以

指掌骨骨折合并软组织损伤的患者作为研究对象,探讨指掌骨骨折合并软组织损伤的微型锁定钢板皮外固定的应用效果及其对关节活动度的影响,具体报告如下。

1 资料与方法

1.1 一般资料

选取我院 2019 年 2 月到 2021 年 2 月共收治的 80 例指掌骨骨折合并软组织损伤的患者作为研究对象,将其随机分为观察组与对照组,每组 40 例。

纳入标准:所有患者均签署知情同意书;指掌骨骨折合并软组织损伤患者^[8];符合手术指征的患者;无精神类疾病患者。

排除标准:长期酗酒者;严重脑代谢疾病、脑血管疾病和痴呆病史者;严重听力、视力障碍者;严重肾、肝、肺、心脏功能障碍者;急性失血性贫血者;2 个或者以上椎体骨折的患者;合并感染或椎体肿瘤的患者;合并神经损伤的患者。

两组患者一般资料对比无明显差异($P>0.05$),具体如表 1 所示。

表 1 一般资料比较
Table 1 Comparison of general data

Groups	n	Gender (male/female)	Average age (years)	Causes		
				Fall injury or car accident	Work accident injury	Clenched fist blow injury
Observation group	40	23/17	34.25± 2.52	9	19	12
Control group	40	21/19	33.78± 2.66	10	17	13
χ^2/t	-	0.202	0.811		0.200	
P	-	0.653	0.420		0.903	

1.2 方法

对所有患者行臂丛神经组织麻醉,并采取平卧位,将患者手部放在小台上展开,依照实际情况给予患者气压止血带。对开放性骨折患者进行常规清创,并在 C 臂透视或直视下将骨折复位;粉碎性骨折患者依照实际情况进行复位后应用微型螺钉或者肌腱缝线进行骨折块的固定^[9];掌指骨关节内骨折的患者将骨折复位之后,为保证关节表面光滑,应用克氏针或拉力螺钉进行骨折块固定;近节指开放骨折合并股缺损者,取髂骨块移植后应用克氏针或拉力螺钉进行固定。

观察组患者在上述内固定基础上,应用直径为 2.0 毫米和 1.5 毫米的不锈钢螺钉与其配套锁定钢板进行骨折外固定,骨折近、远端钻孔置钉,导向器确定螺钉方向,先于远端骨折段或骨折段较短的一端植入螺钉并锁定钢板,钢板与皮肤软组织间保留间隙^[9]。然后在骨折另一端钻孔植入螺钉并锁定钢板另一端,注意避开神经、血管和肌腱。随后针对患者软组织损伤情况决定是否应用石膏进行外固定。

1.3 观察指标

观察并记录两组患者的骨折愈合时间、住院时间和手术时间;患者术后 30 天复查时对患者应用 Jamar 握力计,测量患者算手的握力,并应用 DASH 上肢功能评分量表对患者的恢复程度进行评价,极度为 5 分,重度 4 分,中度为 3 分,轻微为 2 分,无为 1 分^[9,10]。术后 30 天应用总关节活动度(TAM)系统评

价方法来评价患者的治疗效果,其中包括掌指关节和指间的屈曲度;观察并记录术后 1 个月的生活质量情况,生活质量评分采用 QOL-C30 量表进行,包含精神健康、情感职能、社会功能、活力、躯体疼痛、生理职能、生理功能和总体健康 8 项,每项满分 100 分,得分与生活质量成正比^[11]。

1.4 统计学方法

应用 SPSS 23.0,使用($\bar{x} \pm s$)示计量资料,采用 t 检验,使用[n(%)]示计数资料,应用卡方检验, $P<0.05$ 有统计学意义。

2 结果

2.1 骨折愈合时间与围术期相关指标对比分析

观察组患者的手术时间较对照组高,骨折愈合时间和住院时间较对照组低($P<0.05$),如表 2 所示。

2.2 Jamar 握力、TAM 和 DASH 评分对比分析

观察组患者的 DASH 评分明显低于对照组,TAM 与 Jamar 握力明显高于对照组($P<0.05$),如表 3 所示。

2.3 并发症发生情况对比

观察组术后并发症发生率低于对照组($P<0.05$),如表 4 所示。

2.4 手术前后生活质量对比分析

术后 1 个月两组患者生活质量评分均升高,且观察组明显高于对照组($P<0.05$)。如表 5 所示。

表 2 骨折愈合时间与围术期相关指标对比分析($\bar{x} \pm s$)Table 2 Comparison of fracture healing time and perioperative related indexes ($\bar{x} \pm s$)

Groups	n	Fracture healing time (d)	Length of hospital stay (d)	Operation time (min)	Intraoperative blood loss (mL)
The control group	40	81.61± 9.29	7.28± 2.46	58.27± 14.27	42.62± 7.25
The observation group	40	68.58± 7.72	5.27± 1.27	67.54± 19.39	41.71± 8.48
t	-	6.822	4.592	2.435	0.516
P	-	<0.001	<0.001	0.017	0.607

表 3 Jamar 握力、TAM 和 DASH 评分对比分析($\bar{x} \pm s$)Table 3 Comparative analysis of Jamar grip strength, TAM and DASH scores ($\bar{x} \pm s$)

Groups	n	Jamar grip strength (kg)	TAM(°)	The DASH (points)
Control group	40	27.24± 10.16	164.54± 25.73	1.82± 0.41
Observation group	40	36.23± 11.25	211.21± 31.25	1.52± 0.21
t	-	3.751	7.292	4.119
P	-	0.001	0.001	0.001

表 4 并发症情况对比分析(n, %)

Table 4 Comparison of complications (n, %)

Groups	n	Local pain	Wound infection	Nerve damage	Malunion of fracture	Tendon adhesion	The total
Observation group	40	2	1	0	0	1	4(10.00%)
Control group	40	3	3	4	2	2	14(35.00%)
χ^2	-	-	-	-	-	-	7.168
P	-	-	-	-	-	-	0.007

表 5 手术前后生活质量对比分析($\bar{x} \pm s$)Table 5 Comparison of quality of life before and after surgery($\bar{x} \pm s$)

Items	Before operation		t	P	After surgery for one month		t	P
	Observation group(n=40)	Control group (n=40)			Observation group(n=40)	Control group (n=40)		
Mental health	57.54± 6.31	55.21± 7.46	1.508	0.136	76.46± 14.21 ^a	61.37± 13.53 ^a	4.864	0.001
Emotional function	71.46± 10.41	71.59± 9.56	0.058	0.954	90.46± 12.65 ^a	77.46± 14.46 ^a	4.279	0.001
Social Function	67.46± 9.42	65.36± 10.41	0.946	0.347	81.36± 15.03 ^a	74.47± 12.75 ^a	2.211	0.030
Dynamic	60.63± 7.36	61.36± 8.56	0.409	0.684	80.74± 14.37 ^a	71.46± 12.46 ^a	3.086	0.003
Body pain	59.45± 8.45	58.15± 9.12	0.661	0.511	69.37± 12.42 ^a	64.27± 11.41 ^a	1.912	0.060
The role physical	51.46± 9.56	50.33± 10.45	0.505	0.615	67.46± 10.46 ^a	58.46± 9.75 ^a	3.981	0.001
Physiological function	60.35± 8.54	61.45± 7.36	0.617	0.539	72.46± 13.92 ^a	64.62± 10.42 ^a	2.582	0.006
Overall health	54.36± 7.41	55.35± 7.83	0.581	0.563	75.37± 11.36 ^a	62.56± 10.45 ^a	5.249	0.001

Note: Compared with before care, ^aP<0.05.

3 讨论

指掌骨骨折临床上分为开放性骨折和关节内骨折,常见于患者机体第五掌骨,多数为暴力导致^[12]。掌骨参与形成掌指与腕掌,功能比较精细,且骨间肌在骨干上附着,一旦骨折易出现移位现象。依照当前认可的手部骨折治疗原则,在治疗过程中

应追求坚强固定、解剖复位以及早期恢复原则^[13]。但是,高能量暴力所导致的指掌骨骨折现象,多伴随软组织损伤,而且加上日常生活的影响,容易导致软组织感染,最终致使骨折固定失败。因此如何平衡掌骨骨折的坚强固定与软组织损伤,成为当前指掌骨骨折治疗的难点内容。当前对指掌骨骨折采取最广泛的应用方式是克氏针与微型钢板置入,克氏针对于掌骨骨折的

固定操作比较简便,而且价格较低,是临床上常用的固定方法^[14,15]。而微型钢板内固定治疗与克氏针相比组织相容性较好,对于骨折端加压作用和板钉固定系统稳定性更好,固定牢靠,但是这种固定方式的价格高昂,因此患者接受度较低。相关研究显示^[16,17],对于指掌骨骨折患者,在有效内固定的基础上,应用外固定,能够更坚强固定力学强度。因此本文尝试在内固定的基础上联合应用微型锁定钢板进行皮外固定,取得了良好的治疗效果。

本研究结果表明,观察组手术时间较对照组高,骨折愈合时间和住院时间较对照组低,由此证明,虽然观察组患者比对照组患者多了一套外固定程序,增加了手术时间,但却有效提升了骨折固定性,促进患者骨折愈合,减少住院时间。与 Meyer M A 等研究相符,Meyer M A 等研究显示^[18],应用锁定钢板进行皮外固定对指掌骨骨折进行治疗,能够提升治疗优良率,促进患者骨折愈合,减少术后并发症发生。这是因为,锁定钢板进行皮外固定时,与普通接骨板在骨骼表面形成的界面摩擦力不同,而且其力臂比较短,能够减少螺钉的承受应力,因此固定的更加牢固^[19];观察组患者的 DASH 评分明显低于对照组,TAM 与 Jamar 握力明显高于对照组,由此证明,在常规内固定基础上应用微型锁定钢板外固定治疗能够促患者软组织与骨组织愈合,患者的关节活动力更好,提升了患者的上肢运动功能。与 Sikora M 等研究具有一定差异,Sikora M 等研究发现^[20],应用微型钢板植入与常规克氏针相比,虽然应用微型钢板治疗优势显著,能够促进患者早日康复,但是对患者远期握力的提升并无明显差异。这可能是因为本研究样本量过少,因此还需后续增加样本量进行持续深入研究。另 Patiguli 等^[21]研究通过对 50 例指掌骨骨折患者采取微型钢板植入发现,该方法能提升患者术后 3 个月 Jamar 握力与 TAM 水平,与本研究结果相符。其原因为,微型锁定钢板的应用正好为其早期活动防止肌腱黏连提供了牢固的固定基础,不仅操作简单,而且骨折端的血供破坏少,软组织剥离少,尤其适合合并软组织损伤的指掌骨骨折患者的治疗^[22-24]。相关研究显示^[25],对掌骨骨折患者应用克氏针内固定联合外置接骨板外固定,患者治疗效果更好,促进患者关节恢复,虽与本文应用固定材料不同,但间接证明了内外固定联合的方式更有利于患者恢复;观察组患者术后并发症发生率低于对照组,由此证明,应用微型锁定钢板皮外固定,患者的固定程度好,而且减少伤口与软组织感染的情况,患者进行早期康复活动过程中,也能够减少神经损伤^[26];术后 1 个月两组患者生活质量评分均升高,且高于对照组。Ak A 以及 Khashaba H 等人发现^[29,30],对手部指骨掌骨骨折的患者,应用微型外固定器治疗效果显著,便于装卸,而且结构简单,力学性能稳定,促进手部功能恢复,与本研究结果具有一定相关性。其原因为:应用微型锁定钢板皮外固定对于局部软组织的条件要求比较低,有利于患者早期愈合,降低皮肤坏死与关节僵硬等并发症的发生,促进患者手指功能恢复正常^[27,28]。

综上,对指掌骨骨折合并软组织损伤的患者在常规克氏针内固定的基础上,应用微型锁定钢板皮外固定,再进行石膏固定,虽手术步骤、手术时间有所增加,但更有利于患者术后骨折愈合,减少术后并发症的发生,减少住院时间,促进患者出院后关节功能恢复,提高生活质量,值得临床应用推广。

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