

# 针头引导下经皮无头空心加压螺钉内固定治疗急性腕舟状骨非移位性骨折

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**【摘要】** 目的: 探讨针头引导下经皮空心加压螺钉内固定治疗急性腕舟状骨非移位骨折的疗效。方法: 回顾性分析 2014 年 1 月至 2019 年 1 月治疗的急性舟状骨非移位性骨折患者 28 例, 根据术中置入空心螺钉导针方法的不同分为引导组(16 例)和常规组(12 例)。引导组男 13 例, 女 3 例, 年龄 20~60 (31.42±9.71) 岁; Herbert A2 型 5 例, B1 型 3 例, B2 型 8 例, 采取针头引导下经皮空心加压螺钉内固定; 常规组男 11 例, 女 1 例, 年龄 23~61 (30.51±7.52) 岁; Herbert A2 型 5 例, B1 型 2 例, B2 型 5 例, 采取常规经皮空心加压螺钉内固定。观察并对比两组患者的手术时间、术后正侧位 X 线片螺钉与舟状骨长轴夹角、腕关节功能评分。结果: 28 例患者获随访, 时间 20~45 (33.00±8.72) 个月。所有患者无术中并发症, 无手术切口感染, 术后 2 周逐步恢复工作, 骨折 12 周内均愈合。在手术时间上, 引导组少于常规组 ( $P<0.05$ )。在术后 X 线片螺钉与舟状骨轴线夹角上, 引导组小于常规组 ( $P<0.05$ )。末次随访 Mayo 腕关节功能评分差异均无统计学意义 ( $P>0.05$ )。随访期内 28 例患者未出现内固定移位、关节炎、舟状骨坏死等并发症。结论: 针头引导下经皮空心加压螺钉内固定治疗急性腕舟状骨非移位性骨折可节省手术时间, 螺钉位置更容易与舟状骨长轴平行。

**【关键词】** 舟状骨; 骨折; 骨螺钉; 针; 骨折内固定

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## Treatment of acute non-displaced scaphoid fracture of wrist with syringe needle-guided percutaneous cannulated headless hollow compression screw internal fixation

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**ABSTRACT Objective** To investigate the clinical efficacy of needle-guided percutaneous cannulated compression screw fixation in the treatment of acute non-displaced scaphoid fracture of wrist. **Methods** The clinic data of twenty-eight patients with acute non-displaced scaphoid fracture from January 2014 to January 2019 were analyzed retrospectively. According to the intraoperative method of placement of cannulated screw, they were divided into Guide group (16 patients) and Conventional group (12 patients). There were 13 males and 3 females in Guide group, aged from 20 to 60 years old with an average of (31.42±9.71) years old; 5 patients were classified as type A2, 3 patients were classified as type B1 and 8 patients were classified as type B2 according to Herbert classification; they were treated with percutaneous cannulated compression screw fixation under the guidance of needle. There were 11 males and 1 female in Conventional group, aged from 23 to 61 years old with an average of (30.51±7.52) years old; 5 patients were classified as type A2, 2 patients were classified as type B1 and 5 patients were classified as type B2 according to Herbert classification; they were treated with conventional percutaneous cannulated compression screw fixation. The operation time, screw angle relative to the longitudinal axis of the scaphoid and wrist function score were assessed and compared between the two groups. **Results** A total of 28 patients were followed up from 20 to 45 months with an average of (33.00±8.72) months. None of patients had intraoperative complication and incision infection. These patients returned to work gradually 2 weeks after operation, and all fractures healed within 12 weeks. The operation time in the Guide group was significantly less than that in the Conventional group ( $P<0.05$ ). Screw angle relative to the longitudinal axis of the scaphoid in the Guide group was significantly smaller than that in the Conventional group ( $P<0.05$ ). There was no significant difference in Mayo wrist function scores at the last follow-up between the two groups ( $P>0.05$ ). During the follow-up period, none of the 28 patients showed internal fixation displacement, arthritis, scaphoid necrosis and other complications. **Conclusion** In the treatment of acute non-displaced scaphoid fractures, the operation time of needle-guided percutaneous cannulated headless compression screw fixation is significantly shorter than that of conventional percutaneous screw fixation, and the screw

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axis is easier to be parallel to the longitudinal axis of the scaphoid.

**KEYWORDS** Scaphoid bone; Fractures; Screws; Needle; Fracture fixation, internal

对于非移位性其中的骨折为了避免长时间的石膏固定,经皮微创螺钉固定手术使用越来越多,并取得了良好的效果。由于腕舟状骨体积小,形态不规则<sup>[1]</sup>,如何经皮快速准确地在其中置入螺钉是临床一个难点。本研究采用注射器针头引导的方法提高掌侧置钉速度与准确性,并与传统方法相比较,评价该方法的应用效果。

### 1 资料与方法

#### 1.1 病例选择

纳入标准:(1)舟状骨腰部及远节受伤时间<3周急性骨折。(2)行掌侧经皮加压螺钉内固定患者。(3)骨折无移位或<1mm微小移位者。排除标准:(1)开放性骨折。(2)合并月骨周围脱位或其他损伤患者。(3)有类风湿性关节炎、痛风性关节炎,及其他骨病者。(4)合并有影响切口愈合的严重基础疾病,如糖尿病、血栓闭塞性脉管炎等。(5)有恶性肿瘤病史,或其他免疫缺陷、血液病者。(6)有严重骨质疏松者。

#### 1.2 临床资料

对2014年1月至2019年1月,采用掌侧入路经皮空心加压螺钉内固定治疗28例急性腕舟状骨非移位骨折患者进行回顾分析。骨折采用改良Herbert分型<sup>[2]</sup>方法分型。按术中钻入空心螺钉导针的方法分为两组,引导组16例,年龄20~60岁;常规组12例,年龄23~61岁。两组术前一般资料比较差异无统计学意义( $P>0.05$ ),具有可比性,见表1。本研究经江汉大学附属黄陂区人民医院伦理委员会批准(编号:2013110604),且所有患者治疗前被告知治疗详情,并签署知情同意书。

表1 两组急性腕舟状骨非移位骨折患者术前一般资料比较  
Tab.1 Comparison of preoperative general data between two groups of patients with acute scaphoid fracture without displacement

组别	例数	性别/例		年龄 ( $\bar{x}\pm s$ )/岁	优势手/ 例	Herbert 分型/例		
		男	女			A2	B1	B2
引导组	16	13	3	31.42±9.71	8	5	3	8
常规组	12	11	1	30.51±7.52	7	5	2	5
检验值		$\chi^2=0.222$		$t=0.090$	$\chi^2=0.821$	$\chi^2=0.775$		
P值		0.636		0.925	0.365	0.656		

#### 1.3 治疗方法

**1.3.1 手术方法** 手术采用臂丛神经阻滞麻醉,患者侧卧位,患肢外展掌心朝上放置于可透视侧台上,

腕背垫入折叠成圆柱状的治疗巾,助手按压手掌使腕关节极度背伸。常规组采用直接从舟状骨结节向Lister 结节方向钻入直径 0.8 mm 导针,通过 C 形臂 X 线机透视不断调整导针方向的方法,使导针与舟状骨长轴平行。引导组(图 1)采用 1.2 号针头引导,在相同体位下,用 1.2 号针头插入舟状骨结节,C 形臂 X 线机透视调整针头方向与舟状骨长轴平行,位置满意后从空心针芯内钻入直径 0.8 mm 导针。两组患者置入导针满意后常规测深、攻丝,置入合适长度空心无头加压螺钉。

**1.3.2 术后处理** 术后不使用外固定,麻醉消失后指导患者行握拳及肩关节活动,疼痛缓解后指导患者循序渐进进行腕关节伸屈活动,术后 3 d 拍摄 X 线片,按蒋继乐等<sup>[3]</sup>的方法在正侧位 X 线片上测量螺钉与舟状骨长轴夹角。2 周逐步恢复工作,4 周内避免腕关节桡偏活动。待 X 线片出现明确骨折愈合征象之后逐步恢复强度较大的体力活动及体力劳动。

#### 1.4 观察项目与方法

观察并对比两组的手术时间、螺钉与舟状骨长轴夹角,末次随访时根据改良 Mayo 法<sup>[4]</sup>评价术后腕关节功能,共 100 分,91~100 分为优秀,80~90 分为良好,65~79 分为尚可,<64 分为差。观察两组术后并发症发生情况。

#### 1.5 统计学处理

采用 SPSS 18.0 软件进行统计学分析。正态分布的定量资料采用均数±标准差( $\bar{x}\pm s$ )表示,两组间比较采用成组设计定量资料的 t 检验,两组手术前后比较采用配对设计定量资料的 t 检验。定性资料用频数或百分数(%)表示,组间比较采用 $\chi^2$ 检验。以  $P<0.05$  为差异有统计学意义。

### 2 结果

两组患者均获随访,时间 20~45(33.00±8.72)个月,均无术中并发症,无手术切口感染。术后 2 周逐步恢复工作,骨折 12 周内均愈合。手术时间引导组少于常规组( $P<0.05$ ),螺钉与舟状骨轴线夹角,引导组小于常规组( $P<0.05$ ),见表 2。末次随访采用改良 Mayo 腕关节功能评分,两组均为优,两组评分差异无统计学意义( $P>0.05$ ),见表 3。随访期内,28 例均未出现内固定移位、关节炎、舟状骨坏死等并发症。

### 3 讨论

**3.1 手舟状骨骨折分型及非移位或微小移位骨折的治疗方法选择**

由于 Herbert 分型 A1 型骨折位于结节处,不适



**图 1** 患者,男,31 岁,摔伤致右手 Herbert B2 型舟状骨骨折,行注射器引导下经皮无头加压螺钉固定术 **1a,1b**。术前正侧位 X 线片示右手舟状骨腰部无移位骨折 **1c,1d**。术中注射器针头定位示针头延长线与舟状骨中轴平行 **1e,1f**。针头引导下置入导针,导针与舟状骨中轴平行 **1g,1h**。经导针置入无头加压螺钉,螺钉与舟状骨中轴平行

**Fig.1** A 31-year-old patient with Herbert type B2 scaphoid fracture of right hand caused by fall, percutaneous headless compression screw fixation under syringe needle guidance was performed **1a,1b**. Preoperative AP and lateral X-rays showed that there was no displaced scaphoid fracture in the right hand **1c,1d**. Intraoperative needle positioning of syringe showed that the extension line of needle was parallel to the central axis of scaphoid bone **1e,1f**. Guide needle was placed under the guidance of needle. The guide pin was parallel to the central axis of scaphoid **1g,1h**. The cannulated headless compression screw was inserted over the guide wire, and the screw was parallel to the longitudinal axis of scaphoid

**表 2** 两组急性腕舟状骨非移位骨折患者围手术期指标对比 ( $\bar{x} \pm s$ )

**Tab.2 Comparison of operation related parameters between two groups of patients with acute non-displaced scaphoid fracture ( $\bar{x} \pm s$ )**

组别	例数	受伤至手术时间/d	手术时间/min	正位 X 线片螺钉与舟状骨夹角/ $^{\circ}$	侧位 X 线片螺钉与舟状骨夹角/ $^{\circ}$
引导组	16	4.71 $\pm$ 3.10	48.20 $\pm$ 15.30	4.14 $\pm$ 3.88	6.12 $\pm$ 3.96
常规组	12	5.62 $\pm$ 4.01	68.30 $\pm$ 20.20	6.11 $\pm$ 4.76	8.57 $\pm$ 6.77
t 值		0.487	12.554	2.366	3.197
P 值		0.632	0.023	0.032	0.026

合掌侧经结节处进钉的加压螺钉固定;B3 型骨折掌侧入路螺钉固定不牢固,多选择背侧入路。本研究为 A2 型、B1 型、B2 型。大多数学者认为管形石膏固定是治疗无移位及微小移位( $<1\text{ mm}$ )舟骨骨折的首要选择,固定时间以舟骨腰部骨折固定 8~12 周,舟骨结节骨折和部分骨折固定 6~8 周为宜<sup>[5]</sup>。但长时间外固定可导致前臂肌肉萎缩及各种不适<sup>[6]</sup>,青壮年

人群普遍难以接受。经皮微创技术患者可较早恢复工作与活动,避免了长期使用外固定导致的并发症<sup>[7-8]</sup>。本组手术后未使用石膏外固定,患者可早期(2 周后)逐步恢复工作。随访过程中,未出现关节僵硬、肌肉萎缩、骨折延迟愈合不愈合及骨坏死等并发症。因此,对于青壮年患者,或无法耐受长期固定患者的非移位或微小移位舟状骨骨折,可选择经皮微



表 3 两组急性腕舟状骨非移位骨折患者末次随访改良 Mayo 腕关节功能评分比较( $\bar{x}\pm s$ )

组别	例数	疼痛程度	恢复工作状况	关节活动范围	握力	总分
引导组	16	24.61±0.33	24.68±0.27	24.65±0.32	24.32±0.67	98.26±1.50
常规组	12	24.32±0.68	24.03±0.81	24.24±0.71	24.12±0.56	96.71±3.21
<i>t</i> 值		0.387	0.151	0.523	0.756	0.456
<i>P</i> 值		0.889	0.822	0.912	0.914	0.832

创无头加压螺钉内固定手术治疗。

### 3.2 注射器针头引导下置钉的优点及不足

经皮无头空心加压螺钉治疗舟状骨骨折的核心环节为准确置入导针,为了尽量使导针位于舟骨纵轴中心,常规手术中需要多次穿针并不断透视。应用注射器针头引导下穿针有如下优点:(1)穿针准确率高。术中术者只需按常规角度将针头插入舟状骨结节,C形臂X线机透视下将针头延长线调整到平行于舟状骨纵轴,然后在针芯中置入导针,导针不会发生偏移。本研究通过术后正侧位X线片螺钉与舟状骨夹角对比,针头引导组夹角明显小于常规穿针组。说明针头引导可提高空心螺钉置入准确率。(2)手术时间短。经皮加压螺钉治疗舟状骨骨折手术时间主要取决于导针准确置入时间。引导组导针植入时只需手持针头调整方向,操作轻松。常规组需要手持电钻夹持克氏针,并将克氏针钻入舟状骨,调整方向时需抽出克氏针再次钻入。即使克氏针初始方向正确,钻入过程中由于克氏针较软,电钻又较重,继续钻入时仍可发生方向改变。反复调整导针,不仅手术延长,而且舟状骨血供损伤风险可能增高。针头引导下穿针虽然优势明显,但仍然存在不足,即一次成功率无法达到100%。下一步将配合带有出入点指示的瞄准器,可能进一步提高置钉效率。

### 3.3 术中注意事项

注射器针头引导下置入导针操作容易,但术中仍应注意:(1)无论是定位的针头还是置入的导针,多角度C形臂X线机透视必不可少。因此肢体消毒前应让C形臂X线机操作人员掌握舟状骨蝶位,旋前旋后30°位的拍摄方法及观测目标。(2)定位前仔细检查针头开口方向,避免使用侧方开口针头,仔细检查导针能否顺利通过针头内芯及空心螺钉。本研究使用1.2号前方斜口针头,使用直径0.8mm克氏针,能较好满足手术要求。(3)针头插入舟状骨结节

时,如果定位点正确,可尽量将针头插入舟状骨最深处,更有利于针头稳定及位置判断。

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