

三维捆扎复位技术在髌骨骨折治疗中的初步应用研究



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【摘要】 目的 介绍一种三维捆扎复位技术, 探讨其用于髌骨骨折治疗的疗效。方法 将 2015 年 1 月—6 月收治并符合选择标准的 32 例髌骨骨折患者纳入研究, 随机分为巾钳复位组(对照组)和三维捆扎复位组(试验组), 每组 16 例。两组患者性别、年龄、损伤侧别、致伤原因、骨折类型以及受伤至手术时间等一般资料比较, 差异均无统计学意义($P>0.05$)。记录两组患者手术时间、术中透视时间、骨折愈合时间及并发症发生情况, 采用美国特种外科医院(HSS)评分评价膝关节功能。**结果** 术后两组切口均 I 期愈合。两组患者均获随访, 随访时间 10~14 个月, 平均 12.4 个月。试验组手术时间、术中透视时间较对照组明显减少, 比较差异均有统计学意义($t=6.212, P=0.000; t=6.585, P=0.000$)。X 线片复查示, 两组骨折均顺利愈合, 均未出现骨不连、感染和断钉等并发症。两组骨折愈合时间比较差异无统计学意义($t=1.973, P=0.058$)。术后 6 个月试验组膝关节 HSS 评分为(91.6±3.8)分, 明显高于对照组的(86.4±5.5)分, 比较差异有统计学意义($t=-3.105, P=0.004$)。**结论** 与传统巾钳复位技术相比, 三维捆扎复位技术用于髌骨骨折治疗能够缩短手术时间及术中透视时间, 在不影响骨折愈合情况下, 膝关节功能恢复更好。

【关键词】 髌骨骨折; 三维捆扎; 巾钳复位; 复位技术

Clinical study of three-dimensional strapping reduction in treatment of patellar fracture

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【Abstract】 Objective To investigate the effectiveness of three-dimensional strapping reduction in treatment of patellar fracture. **Methods** Between January 2015 and June 2015, thirty-two patients were randomly allocated to three-dimensional strapping reduction group (trial group) and towel clamp reduction group (control group). There was no significant difference in age, gender, damage side, interval from injury to operation, fracture pattern, and cause of injury ($P>0.05$). The operation time, fluoroscopy time, fracture healing time, postoperative Hospital for Special Surgery (HSS) scores, and complications were collected and analysed. **Results** All incisions healed at stage I. All patients of 2 groups were followed up 10-14 months (mean, 12.4 months). The operation time and fluoroscopy time of trial group were both shorter than those of control group ($t=6.212, P=0.000; t=6.585, P=0.000$). X-ray films showed that the fractures in both groups healed successfully and there was no significant difference in healing time between groups ($t=1.973, P=0.058$). Bone nonunion, infection, and failure fixation were not found in both groups. HSS scores of trial group (91.6±3.8) was higher than that of control group (86.4±5.5) ($t=-3.105, P=0.004$). **Conclusion** Compared with towel clamp reduction, the three-dimensional strapping reduction in treatment of patellar fracture has the advantages of shorter operation time and fluoroscopy time, better knee function after operation, and satisfactory fracture healing.

【Key words】 Patellar fracture; three-dimensional strapping; towel clamp reduction; reduction technology

髌骨骨折是临床常见的一种骨折类型,约占全部骨折的1%,常为暴力所致,骨折后伸膝装置破坏,严重影响膝关节功能,常需要手术干预^[1-4]。髌骨骨折手术治疗关键在于恢复关节面平整,避免髌股关节创伤性关节炎发生^[5-7]。目前临床上髌骨骨折复位常用方法是利用巾钳交叉钳夹复位,术中仅能在髌骨外表面进行复位观察,无法保证关节面确切复位,且对于髌骨粉碎性骨折复位的可操控性较差,因此髌骨骨折复位不良、发生创伤性关节炎风险较大^[8-9]。基于此,本课题组设计了一种新复位技术——三维捆扎复位,即利用缝线经关节面自内向外三维立体捆扎髌骨骨折块,于髌前收紧打结进行复位,经医院伦理委员会批准于2015年1月用于临床治疗髌骨骨折。现对三维捆扎复位与传统巾钳复位治疗的髌骨骨折患者进行比较,分析三维捆扎复位技术在髌骨骨折治疗中的价值。报告如下。

1 临床资料

1.1 一般资料

纳入髌骨骨折患者,排除病理性骨折、骨关节炎、类风湿性关节炎、合并其他部分骨折患者。2015年1月—6月,共32例髌骨骨折患者符合选择标准,纳入研究。根据入院时间将患者分为巾钳复位组(对照组)和三维捆扎复位组(试验组),每组16例。患者均知情同意。

试验组:男8例,女8例,年龄20~65岁,平均40.6岁。左侧6例,右侧10例。致伤原因:摔伤11例,交通事故伤5例。均为闭合性损伤。骨折类型:简单骨折7例,粉碎性骨折9例。受伤至手术时间为2~9d,平均4.2d。

对照组:男9例,女7例,年龄21~66岁,平均37.5岁。左侧7例,右侧9例。致伤原因:摔伤9例,交通事故伤7例。均为闭合性损伤。骨折类型:简单骨折9例,粉碎性骨折7例。受伤至手术时间为1~9d,平均4.2d。

两组患者性别、年龄、损伤侧别、致伤原因、损伤类型、骨折类型以及受伤至手术时间等一般资料比较,差异均无统计学意义($P>0.05$)。

1.2 手术方法

两组手术均由同一组医师完成。

试验组:椎管内麻醉后患者取仰卧位。取髌前直切口暴露骨折端,清理骨折端血凝块及腱膜组织,观察并计数髌骨骨折线。使用1-0爱惜邦缝线(缝线数量=主要骨折线数量+1)自骨折端经髌骨关

节面向髌骨周缘软组织穿出,直视下复位髌骨骨折,于髌骨外表面逐一对应收紧缝线并打结,检查髌骨关节面平整性。C臂X线机透视确认髌骨关节面复位满意后,屈膝70°位,采用张力带线缆最终固定,去除捆扎缝线。粉碎性骨折可使用Herbert钉固定较大的游离骨折块后进行最终固定。见图1。

对照组:麻醉方法、患者体位、手术入路及骨折端暴露方法同试验组。清除骨折断端软组织后,利用2~3把巾钳复位固定髌骨骨折,C臂X线机透视检查髌骨关节面复位情况;如复位不满意,松开巾钳后重新调整直至关节面平整。对于粉碎性骨折,首先使用Herbert钉固定较大的游离骨折块,再进行巾钳复位,张力带线缆最终固定。

1.3 术后处理及疗效评价指标

术后即开始股四头肌功能锻炼,CPM被动屈伸膝关节,2周内达90°,4周内恢复正常被动屈伸活动。2周内可去拐负重行走,8周内恢复主动屈伸活动。

记录两组患者手术时间、术中透视时间及并发症发生情况。X线片复查,观察骨折愈合情况,并记录骨折愈合时间。采用美国特种外科医院(HSS)评分评价膝关节功能。

1.4 统计学方法

采用SPSS19.0统计软件进行分析。数据以均数±标准差表示,组间比较采用 t 检验;检验水准 $\alpha=0.05$ 。

2 结果

术后两组切口均I期愈合。两组患者均获随访,随访时间10~14个月,平均12.4个月。试验组手术时间、术中透视时间分别为(44.5±7.9)、(15.2±3.2)min,与对照组(63.1±9.1)、(25.8±5.6)min相比明显减少,比较差异均有统计学意义($t=6.212$, $P=0.000$; $t=6.585$, $P=0.000$)。X线片复查示,两组骨折均顺利愈合,均未出现骨不连、感染和断钉等并发症。试验组及对照组骨折愈合时间分别为(11.9±1.2)、(12.8±1.5)周,比较差异无统计学意义($t=1.973$, $P=0.058$)。术后6个月试验组膝关节HSS评分为(91.6±3.8)分,较对照组(86.4±5.5)分明显提高,比较差异有统计学意义($t=-3.105$, $P=0.004$)。见图2、3。

3 讨论

髌骨骨折约占全身骨折的1%,20~50岁人群

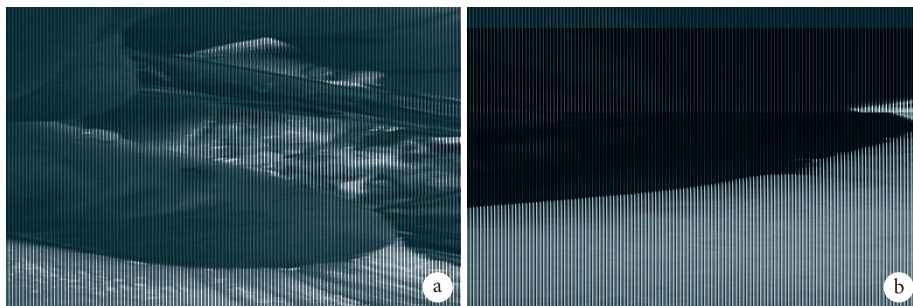


图 1 试验组患者,女,57岁,左髌骨粉碎性骨折正侧位 X 线 a. 术前; b. 术后即刻; c. 术后 1 年

Fig.1 Anteroposterior and lateral X-ray films of a 57-year-old female patient in trial group with comminuted fracture of left patella a. Before operation; b. At immediate after operation; c. At 1 year after operation

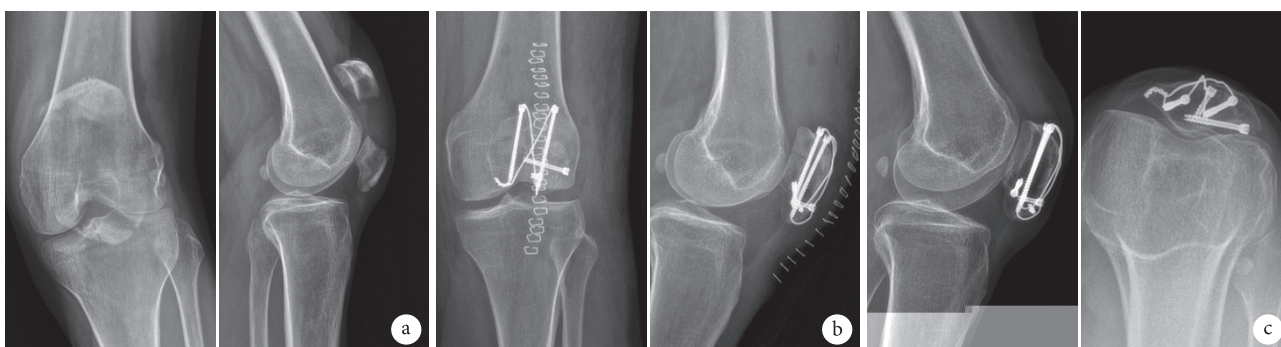


图 2 试验组患者,女,57岁,左髌骨粉碎性骨折正侧位 X 线 a. 术前; b. 术后即刻; c. 术后 1 年

Fig.2 Anteroposterior and lateral X-ray films of a 57-year-old female patient in trial group with comminuted fracture of left patella a. Before operation; b. At immediate after operation; c. At 1 year after operation

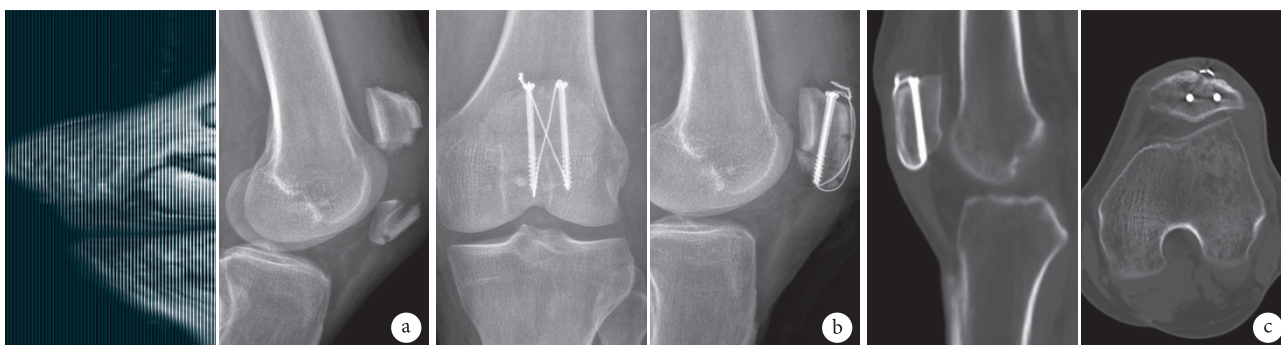


图 3 对照组患者,男,53岁,左髌骨粉碎性骨折 a. 术前 CT 及侧位 X 线片; b. 术后即刻正侧位 X 线片; c. 术后 1 年 CT

Fig.3 A 53-year-old male patient with comminuted fracture of left patella in control group a. CT and lateral X-ray film before operation; b. Anteroposterior and lateral X-ray films at immediate after operation; c. CT at 1 year after operation

常见,男女比例约为 2 : 1^[2]。大部分髌骨骨折是由直接暴力造成,跌倒时股四头肌剧烈反向收缩是最常见的间接暴力损伤机制^[3-4]。作为全身最大的籽骨,髌骨在膝关节屈伸活动中发挥着重要的杠杆及力量传导作用。此外,髌骨形态完整性及关节面平整性对于髌股关节功能的发挥也有显著影响。因此,对于髌骨骨折,恢复伸膝装置连续性及关节面平整,避免创伤性关节炎的发生,被认为是治疗的首要目标^[5-7,10]。

临床对于稳定的无移位髌骨骨折(移位<2 mm),采取保守治疗;所有不稳定骨折选择手术治疗。张力带技术是髌骨骨折手术治疗的金标准^[11-14],该技术主要是通过平行克氏针及单股钢丝“8”字固定来实现骨折复位并固定,存在如软组织激惹、钢丝松脱失效等问题,因此近年来学者们对其进行了改良。有学者采用不可吸收聚酯编织缝线代替钢丝^[15-16];另有学者提出空心螺钉张力带技术,利用 2 枚空心螺钉替代克氏针完成张力带的作用,并认

为该改良技术在防止骨折再移位方面更具优势^[17-19]。随后,经皮空心螺钉张力带技术被提出,使髌骨骨折复位内固定术更加微创,对髌骨骨折块血供保护更好,也使得关节镜下治疗髌骨骨折成为一种新的趋势^[20]。最新研究提出了髌骨表面解剖钢板的设计,为髌骨骨折的治疗提供了新思路^[21-25]。

不论选择哪种固定方式,髌骨骨折解剖复位、恢复关节面平整,以避免创伤性关节炎的发生,是术者重点关注问题。目前临床髌骨骨折复位常用方法是利用巾钳交叉钳夹复位,主要存在以下缺陷:①术中钳夹后仅能在髌骨外表面进行复位观察,无法确认关节面复位平整性;②髌骨四周呈斜面结构,钳夹复位时往往存在外表面侧汇聚、关节面侧张开的趋势,不利于关节面复位;③钳夹复位后张力带植入过程中,可能会影响手术操作及术中透视,且存在复位丢失可能;④对于髌骨粉碎性骨折,巾钳钳夹往往缺乏可靠的钳夹点,复位可操控性较差,因此关于髌骨骨折复位不良、发生创伤性关节炎的报道较多^[8-9,26]。

基于此,本课题提出一种新的三维捆扎复位技术,术中根据髌骨骨折线数量,选择1-0爱惜邦缝线(缝线数量较骨折线多1根)自骨折端经髌骨关节面向髌骨周缘软组织穿出,直视下复位髌骨骨折,于髌骨外表面逐一对应收紧缝线并打结,即利用缝线经关节面自内向外三维立体捆扎髌骨骨折块,于髌前收紧打结达骨折复位。我们认为与传统巾钳复位法相比,该技术存在如下优势:①可应用于所有髌骨骨折类型,尤其是粉碎性骨折;②操作简单,缩短手术时间;③缝线自内向外三维整体捆绑髌骨,贴服顺应性更好,且复位力量呈向心性汇聚,复位更可靠;④捆扎复位后可任意屈伸膝关节,便于后续手术操作;⑤不影响术中透视。本研究结果显示,相较于传统巾钳复位固定,三维捆扎复位技术能缩短手术时间,减少术中透视时间,同时能保证良好的临床疗效。

但本研究也存在一定局限性。首先,该技术理论体系及操作规范流程尚需要进一步明确。其次,三维捆扎复位技术缺少生物力学试验结果支持;再次,本研究样本量少,随访时间短,有待扩大样本量进一步总结该技术疗效。

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