

自制钢丝导针在后交叉韧带胫骨止点骨折中的应用

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【摘要】 目的: 探讨利用自制钢丝导针在后交叉韧带胫骨止点骨折切开复位钢丝内固定手术中辅助引导钢丝进出胫骨隧道的治疗效果。**方法:** 回顾分析 2011 年 2 月至 2014 年 6 月收治 22 例后交叉韧带胫骨止点骨折, 其中男 17 例, 女 5 例; 年龄 17~63 岁, 平均 35.6 岁。按 Meyers 分型标准, II 度 9 例, III 度 13 例。所有患者采用膝关节后内侧倒“L”形入路切开复位, 术中使用自制钢丝导针辅助完成钢丝内固定手术治疗。**结果:** 22 例均利用自制钢丝导针辅助快速完成钢丝穿过胫骨隧道操作。所有患者术后 6 个月随访 X 线检查提示骨折愈合良好, 膝关节 Lysholm 评分结果提示功能良好, 后抽屉试验阴性。**结论:** 自制钢丝导针简化了钢丝穿过胫骨隧道的手术操作, 有效地缩短了手术时间, 减少手术创伤和手术并发症, 值得临床推广使用。

【关键词】 膝关节; 骨折; 骨折固定术

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Application of a self-made steel wire guide in the treatment of avulsion fractures of tibial posterior cruciate ligament

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ABSTRACT Objective: To explore the effect of a self-made guiding needle of steel wire in guiding the wire through the tibial tunnel for the treatment of avulsion fractures of tibial posterior cruciate ligament with open reduction and wire fixation. **Methods:** From February 2011 to June 2014, a total of 22 patients with avulsion fractures of tibial posterior cruciate ligament underwent surgical treatments were analyzed, including 14 males and 8 females with an average age of 35.6 years old (ranged, 17 to 63 years old). According to Meyers classification, 9 patients were classified as type II, 13 patients were classified as type III. All the patients underwent open reduction and wire fixation with medial knee “L” shape approach. A wire guiding needle was used to guide the wire through the tibial tunnel during operation. **Results:** With the assistance of wire guidance needles, wires passed through the tibial tunnel rapidly during the operation in all the 22 patients. All the patients were followed up, X-ray imagings 6 months after operation showed the fractures healed well. The average follow-up time in all patients was 6 months (ranged, 6 to 12 months). The averaged Lysholm knee score in 22 knee was 92.7±3.4. All patients’ posterior drawer test were negative. **Conclusion:** Self-made wire guiding needle can simplify the operation procedures in which the wires pass through the tibial tunnel, shorten the operation time, reduce the surgical trauma and complications, and be worthy of clinical application.

KEYWORDS Knee joint; Fractures; Fracture fixation

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膝关节后交叉韧带 (posterior cruciate ligament, PCL) 胫骨止点撕脱骨折保守治疗因复位困难、复位不全、骨折再移位等导致后交叉韧带松弛, 引起膝关节不稳, 严重影响膝关节功能^[1]。移位骨折需手术治疗已成为共识, 包括开放或关节镜下复位内固定, 关节镜操作较复杂, 技术要求高, 存在较长的学习曲线, 应用受到一定限制, 切开复位内固定仍是目前临床主要的手术方式。自 2011 年 2 月至 2014 年 6 月对

22 例后交叉韧带胫骨止点骨折行后内侧入路切开复位, 术中使用自制钢丝导针辅助完成钢丝内固定手术治疗, 疗效满意。

1 临床资料

2011 年 2 月至 2014 年 6 月收治膝后交叉韧带胫骨止点骨折 22 例, 其中男 17 例, 女 5 例; 年龄 17~63 岁, 平均 35.6 岁; 交通伤 12 例, 扭伤 7 例, 其他伤 3 例。按 Meyers 等^[2]分型, II 度 9 例, III 度 13 例。

2 治疗方法

2.1 钢丝导针的制作

委托专业模具公司制造出 4 种不同规格空心导

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针,材料为不锈钢,长均为 20 cm,外径分别为 2.5、2.0、1.5、1.0 mm,管壁厚度为 0.5 mm(图 1)。本组病例选用钢丝导针外径 2.0、1.5 mm,管径分别为 1.5、1.0 mm,选用钢丝为直径 1.0~0.6 mm。



图 1 钢丝导针,材料为不锈钢,长度均为 20 cm,由右到左外径分别为 2.5、2.0、1.5 及 1.0 mm,管壁厚度 0.5 mm

Fig.1 Steel wire guiding needle, stainless steel as its material; the average length is 20 cm; the external diameters (from the right to the left) are 2.5, 2.0, 1.5, 1.0 mm; its tube thickness is 0.5 mm

2.2 手术方法

手术时间为伤后 3~14 d,平均 5.7 d。采用腰硬联合麻醉,取患者俯卧位,常规取膝后内侧倒“L”切口长 7~10 cm(图 2)。切开皮肤、皮下,保护腓肠内侧皮神经。屈曲膝关节 30°~45°,使腓肠肌松弛,自腓肠肌内侧头与半膜肌间隙进入,将腓肠肌内侧头及腓神经血管拉向外侧,半膜肌、半腱肌拉向内侧,显露膝后关节囊,打入直径 2.0~2.5 mm 克氏针 2~3 枚在胫骨平台后外侧缘做牵开软组织用。切开关节囊,显露并清理骨折断端,直视下复位并用 1~2 枚细克氏针临时固定骨折块。选用直径 2.5 mm 或 2.0 mm 克氏针钻取骨隧道,如骨折块较小或骨折粉碎,可于骨折块两侧对准胫骨结节内侧钻取 2 个骨隧道。为避免钢丝切割骨质致内固定失效,骨隧道外口保证间距 1~1.5 cm 以上,拔出克氏针,选用较钻隧道克氏针小一号钢丝导针(2.5 mm 克氏针选用 2.0 mm 钢丝导针,2.0 mm 克氏针选用 1.5 mm 钢丝导针)从骨隧道胫后插入骨隧道,从胫前皮肤穿出,同法钻取及置入另 1 枚空心导针,选用直径 0.6~1.0 mm 钢丝,钢丝两端通过钢丝导针在胫骨结节内侧穿出,“U”形固定骨折块。拉紧钢丝并打结,剪短尾结预弯埋于皮下贴近骨质(图 3)。骨折块较大,直径超过 1.5 cm 者,在骨折块两端对准胫骨结节内侧钻取 2 个骨隧道,余同前。固定查后抽屉试验、反 Lachman 试验阴性。

2.3 术后处理

术后辅助石膏或支具外固定保护 2~4 周,术后



图 2 患者,男,35 岁,膝后内侧倒“L”形切口,上部由外向内顺腓窝部皮纹做横切口,达菱形窝内侧时再弧向下做下部切口,长 7~10 cm

Fig.2 A 35-year-old patient, the inverted L-shaped incision of posterior medial knee. The upper incision was initiated with a horizontal cut, from outward to inward, along the skin texture of popliteal fossa, when reaching the inner fossae rhomboidea. A vertical cut was then made by moving down in an arc to make the lower incision at the length of 7 cm to 10 cm

2 周膝关节伸直位固定,术后第 2 天开始行踝泵、股四头肌等长收缩,并逐渐直腿抬高功能锻炼,期间可辅助下肢 CPM 关节松动功能锻炼。粉碎性骨折维持外固定保护至术后 4 周,术后 4 周膝关节活动至少达到屈曲 90°以上,伸直正常,拆除外固定,逐渐开始下地负重锻炼。术后 3 个月避免跑跳等剧烈活动。

3 结果

22 例手术时间 35~80 min,平均 55 min。术后随访 6~12 个月,切口愈合不良 2 例,原因为电刀使用不当致切口皮下脂肪液化,无感染发生,经换药处理切口术后 3 周愈合,无血管、神经损伤并发症。术后 6~8 个月复查 DR 提示骨性愈合,依据 Lysholm 等膝关节评分系统评估膝关节功能^[1]:本组膝关节功能评分 88~96 分,平均(92.7±3.4)分,其中疼痛(23.1±2.0)分,肿胀(9.4±0.7)分,跛行(4.7±0.5)分,支撑(4.1±0.7)分,爬楼梯(9.9±1.8)分,不稳(21.2±2.6)分,下蹲(4.2±0.3)分,交锁(14.3±1.8)分,后抽屉试验均阴性。典型病例见图 4。

4 讨论

后交叉韧带胫骨止点骨折可引起胫骨平台处于后半脱位状态,限制关节屈伸活动的同时亦使关节内各间室组织受力改变而形成继发损害^[3]。目前,临床上后交叉韧带胫骨止点骨折分型尚无统一标准,大多学者依然沿用 Meyers 等^[2]的分型标准,将后交叉韧带胫骨止点骨折分为 3 型:Ⅰ型,骨折无移位;Ⅱ型,骨折部分移位,为一侧有连接而另一侧移位的悬吊骨折;Ⅲ型,完全分离的撕脱骨折。对于Ⅰ型损伤因骨折无移位,多建议保守治疗;对于移位的Ⅱ型及Ⅲ型骨折,大多认为需手术复位固定治疗,恢复韧带张力,以期较好地恢复后交叉韧带的功能^[4-7]。

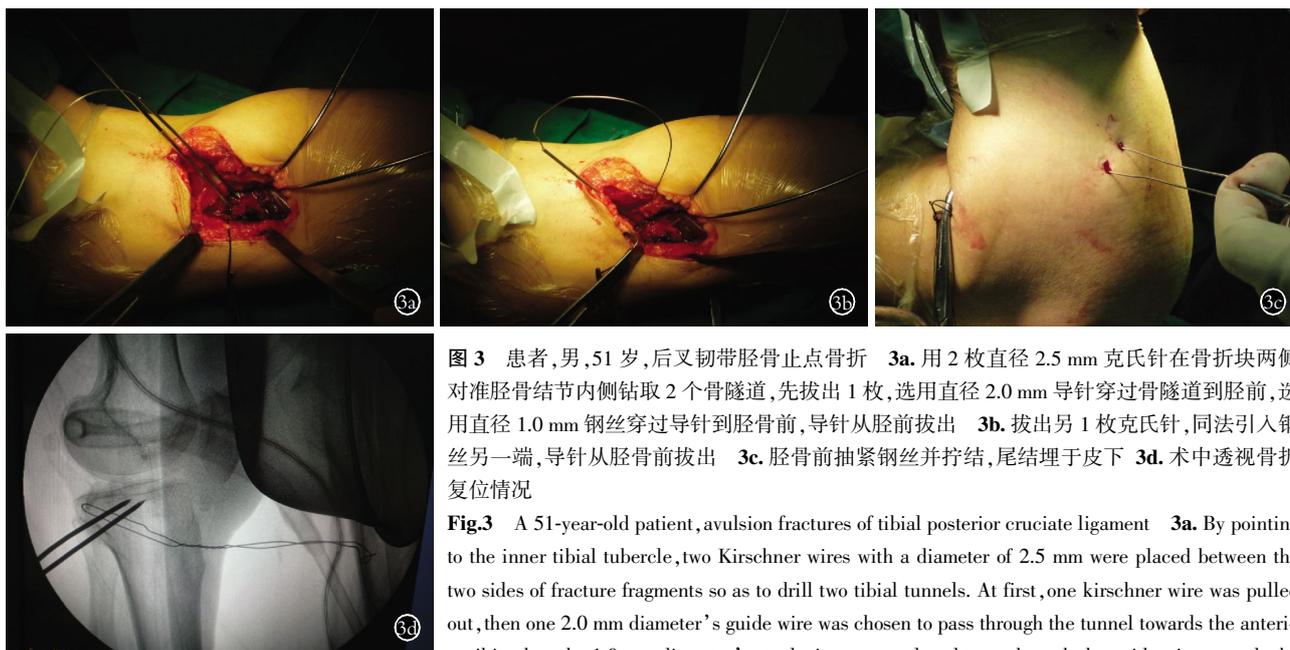


图 3 患者,男,51 岁,后叉韧带胫骨止点骨折 3a. 用 2 枚直径 2.5 mm 克氏针在骨折块两侧对准胫骨结节内侧钻取 2 个骨隧道,先拔出 1 枚,选用直径 2.0 mm 导针穿过骨隧道到胫前,选用直径 1.0 mm 钢丝穿过导针到胫骨前,导针从胫前拔出 3b. 拔出另 1 枚克氏针,同法引入钢丝另一端,导针从胫骨前拔出 3c. 胫骨前抽紧钢丝并拧结,尾结埋于皮下 3d. 术中透视骨折复位情况

Fig.3 A 51-year-old patient, avulsion fractures of tibial posterior cruciate ligament 3a. By pointing to the inner tibial tubercle, two Kirschner wires with a diameter of 2.5 mm were placed between the two sides of fracture fragments so as to drill two tibial tunnels. At first, one kirschner wire was pulled out, then one 2.0 mm diameter's guide wire was chosen to pass through the tunnel towards the anterior tibia, then the 1.0 mm diameter's steel wire was employed to go through the guide wire towards the anterior tibia, from which the guide wire was then pulled out 3b. After pulling out the other kirschner wire, the same method was used to draw the other end of the steel wire and then the guide wire was taken away from the anterior tibia 3c. Hardly pull the steel wire and tighten it at the place of anterior tibia and lay the caudal knot beneath the skin 3d. Reduction of fracture was checked by the intraoperative fluoroscopy



图 4 患者,男,45 岁,车祸伤,右膝后交叉韧带胫骨止点撕脱骨折, Meyers III 型 4a,4b. 术前 CT 4c,4d. 术前三维重建 4e,4f. 术后 1 周三重建 4g,4h. 术后 1 周 DR

Fig.4 A 45-year-old patient, car accident injury at right knee, avulsion fractures of tibial posterior cruciate ligament, Meyers classification of type III 4a,4b. Preoperative CT 4c,4d. Preoperative three dimensional reconstruction 4e,4f. Postoperative three dimensional reconstruction after 1 week 4g,4h. Postoperative DR after 1 week

4.1 手术方式的选择

膝关节镜下骨折复位内固定有创伤小、术后恢复快等优点,但后交叉韧带胫骨止点位于胫骨平台后方,镜下操作困难,操作风险大并且关节镜下难以达到完全解剖复位,而且固定相对不牢靠^[5]。同时,因镜下手术技术要求较高,学习曲线较长,难以广泛开展。而切开复位技术临床已普及,Burks 等^[8]提出膝后内侧倒“L”切口,避免了传统膝后正中“S”切口分离及损伤腓血管神经之虑,可以充分暴露后交叉韧带胫骨止点的骨块,更好地清理嵌入骨折端的软组织,避免了在复位过程中周围软组织再次嵌入骨折端,减少了骨不愈合发生概率。因此,切开复位内固定仍被更多医师所接受。

4.2 内固定物的选择

后交叉韧带胫骨止点骨折内固定,包括普通螺钉、空心钉、可吸收螺钉、带线锚钉、缝合线、钢丝等,文献报道均可取得良好疗效^[9-10]。但相对而言,缝线固定骨块不够牢固;螺钉固定要求骨折块较大,不适合小的碎骨块及粉碎性骨折,手术过程中骨块易出现爆裂致固定失效,Ⅱ期手术取出时创伤较大;带线锚钉、可吸收螺钉无须Ⅱ期取出,但价格昂贵。钢丝几乎适合所有类型骨折,固定坚强可靠,经济实惠,且骨折愈合后取出方便,可在门诊局麻下胫前小切口取出,术后恢复快,减轻了患者病痛及经济负担,具有良好的临床利用价值。

4.3 钢丝内固定存在的问题

术中在准备好骨隧道后,从胫后向胫前导入钢丝较困难,原因在于:(1)骨隧道壁粗糙,钢丝尖端易嵌插在骨隧道壁。(2)钢丝相对较柔软,经过骨孔道时因摩擦阻力大容易折弯,术中往往需反复尝试,无疑增加了手术时间及创伤。另外,术中选择钢丝直径过细,骨隧道外口保留间距过小,钢丝抽紧时太过用力、尾结拧得过紧等因素,均可能出现术中术后钢丝切割骨质、断裂,导致内固定失效。本组选用直径 0.6~1.0 cm 钢丝,骨隧道外口保证间距 1~1.5 cm 以上,抽紧钢丝及拧紧尾结时避免使用暴力,术中术后未出现钢丝内固定失效。为避免钢丝切割骨质及疲劳折断,笔者建议尽量选用粗直径钢丝。

4.4 钢丝导针的优势

钢丝导针因具有一定强度,不易折弯,在拔出钻克氏针后,可轻易在胫后骨隧道口插入导针至胫前皮肤穿出,为保证顺利插入钢丝导针,可选用较钻取骨隧道的克氏针小 1 号的导针,2.5 mm 克氏针选用外径 2.0 mm 钢丝导针,管径为 1.5 mm,可通过直径 1.0 mm 钢丝,2.0 mm 克氏针选用外径 1.5 mm 导

针,管径为 1.0 mm,可通过直径 0.6 mm 钢丝。钢丝导针坚硬,内壁光滑,导入钢丝时不会折弯、嵌顿,无须反复尝试,可做到一次成功,解决了术中难以将钢丝直接从骨隧道导出的问题,有效减少了手术时间及创伤。

综上,在后交叉韧带胫骨止点骨折切开复位钢丝内固定中,借助钢丝导针可简化手术,有效缩短手术时间,减少了手术创伤,值得临床推广使用。

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