

锁定加压钢板治疗不稳定骶骨骨折的初步报道

杜明奎, 王秋根*, 纪方, 汪滋民, 汪方, 吴剑宏

(第二军医大学长海医院骨科, 上海 200433)

[摘要] **目的:** 分析锁定加压钢板在不稳定骶骨骨折治疗中的作用。**方法:** 我科用锁定加压钢板治疗 9 例不稳定骶骨骨折患者。其中男 7 例, 女 2 例; 年龄 25~49 岁, 平均 34.8 岁。按照 AO 方法分型: B 型损伤 7 例, 其中 B₁ 型 1 例, B₂ 型 4 例, B₃ 型 2 例, C₁ 型 2 例。按照 Denis 方法分型: I 区 6 例, II 区 3 例(其中双侧 1 例)。于双侧髂后上棘外侧顺髂嵴作弧形切口(6~8 cm), 显露骨折或脱位, 复位骨折、脱位, 必要时修复骶髂后韧带(B₂、B₃、C 型), 选用一块 LCP, 预弯塑形, 在患侧将 LCP 通过皮下隧道送到对侧, 放置于双侧髂骨背侧, 拧上锁定螺钉, 以每侧固定 3 枚螺钉为有效固定, X 线透视见复位满意后缝合各层。手术时间 30~80 min, 平均 45 min, 术中无输血, 出血 100~400 ml。术中 X 线暴露时间平均为 4 min(2~10 min)。**结果:** 本组 9 例患者全部得到随访, 随访时间 6~21 个月, 平均 13.8 个月。所有患者术后无神经损伤, 腰骶及下肢活动、感觉均正常。根据 Majeed 评分标准评定, 优 4 例, 良 4 例, 可 1 例。**结论:** 锁定加压钢板治疗不稳定骶骨骨折操作简单、创伤小, 并发症少, 是治疗不稳定骶骨骨折的有效方法之一。

[关键词] 锁定加压钢板; 骶骨; 骨折; 治疗结果

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Locking compression plate fixation in treatment of unstable sacral fracture

DU Ming-kui, WANG Qiu-gen*, JI Fang, WANG Zi-min, WANG Fang, WU Jian-hong (Department of Orthopedics, Changhai Hospital, Second Military Medical University, Shanghai 200433, China)

[ABSTRACT] **Objective:** To analyze the clinical outcomes of the locking compression plate(LCP) fixation for the unstable sacral fracture. **Methods:** Nine patients with unstable sacral fracture were treated with locking compression plate fixation in our department, including 7 males and 2 females, with an average age of 34.8 years (ranged from 25 to 49 years). AO classification system found 1 B₁, 4 B₂, 2 B₃ and 2 C₁ type. Dennis classification found 6 I section sacral fracture and 3 II section sacral fracture. Incisions (6-8 cm) were made from each side of superior iliac spine to ipsilateral inferior iliac spine along iliac crest. After the fractures or dislocations were exposed and reduced, LCPs were chosen and remodeled. The iliosacral posterior ligaments were restored if injured. The LCP was pushed cutaneously to the other incision, placed on both dorsal ilia and fixed with locking screws. Each side of postal LCP was fixed with 3 locking screws for effective fixation. The reduction and fixation of fractures or dislocation were assured by radiostereoscopy. The operations lasted 45 min averagely (ranged from 30-80 minutes) and no patient needed blood transfusion. The average X-ray exposure period was 4 min(from 2-10 minutes). **Results:** All the patients were followed-up for a mean of 13.8 months, ranged from 6 months to 21 months. There was no iatrogenic nerve injury. The function and the feeling of sacroiliac joint and low extremities recovered to normality. According to the Majeed standards, the results were excellent in 4, good in 4, and fair in 1. **Conclusion:** The locking compression plate fixation is a simple and effective treatment for the unstable sacral fractures, with less trauma and complications.

[KEY WORDS] locking compression plate; sacrum; fractures; treatment outcome

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骶骨为躯干和下肢负重传递的枢纽, 其损伤的治疗越来越引起了骨科医生的重视。目前对于不稳定性骶骨骨折的治疗, 多数学者主张手术恢复、重建骨盆的稳定性^[1]。但由于其局部组织结构多且复杂, 因而手术难度较大, 多数学者主张于后路采用骶髂螺丝钉或骶骨棒进行固定治疗^[2,3]。但对于骶骨 II 区、III 区骨折或骶骨骨折合并髂骨翼骨折的患者治疗困难, 效果差。4.5 mm 锁定加压钢板(locking compression plate, LCP)作为内支架在四肢长骨中得到了很好地应用, 对于骶骨骨折能否采用内支架

技术进行固定, 这方面报道甚少^[4]。我们应用该法治疗了 9 例不稳定骶骨骨折, 现初步报道如下。

1 资料和方法

1.1 一般资料 本组 9 例患者, 男 7 例, 女 2 例; 年龄 25~49 岁, 平均 34.8 岁。致伤原因: 3 例撞伤, 4

[作者简介] 杜明奎, 硕士生, 主治医师。

E-mail: dumingkuibj@sina.com

* Corresponding author. E-mail: wangqiugen@126.com

例挤压伤,2例坠落伤。按照AO方法分型^[5]:B型损伤7例,其中B₁型1例,B₂型4例,B₃型2例,C₁型2例。按照Denis分型^[6]:I区6例,II区3例(包括1例双侧II区骨折)。合并创伤性休克2例;骶髂关节脱位5例,合并髂骨骨折5例;腰第2、3椎体横突及棘突骨折2例;腰第5椎体横突骨折2例;右侧血气胸、前颅窝损伤1例;尿道损伤2例;膀胱损伤1例;腰第5神经根损伤2例;骶丛神经损伤3例。术前均进行了骨盆前后位X线摄片及骨盆CT扫描。受伤到手术时间为7h到15d,平均为7d。术前对患者进行适当的下肢牵引复位,以利于术中复位。

1.2 手术方法 患者取俯卧位,分别于双侧髂后上棘外侧顺髂嵴作弧形切口,患侧作8~10cm的切口,另外一侧作6~8cm左右的切口。切开皮肤、皮下组织直至骨膜外,在骨膜外剥离,避免损伤臀上神经、血管。显露骨折或脱位处,复位骨折、脱位,利用复位器械予以牵拉、撬拨、挤压等方法复位骶髂关节的垂直及旋转移位。必要时修复骶髂后韧带(B₂、B₃、C型)。根据骨折情况选用一块LCP,长度以双侧髂骨能够固定3枚以上螺钉为宜,然后将LCP进行预弯塑形(不必严格解剖塑形),在患侧将LCP一端通过皮下隧道送到对侧,放置于双侧髂骨背侧,然后分别拧上锁定螺钉,以每侧固定3枚螺钉为有效固定。螺钉穿透双侧皮质骨当然更好,但根据设计要求,穿透一侧皮质骨也能够达到有效固定。在对侧无重要组织时,螺钉固定应穿透双侧皮质骨,在不损伤神经的情况下,固定骶髂关节为好,但本组病例中均未穿透骶髂关节固定。髂骨翼骨折线较长时可局部加螺钉固定,但只要骨折两侧有3枚以上的螺钉固定,就足以达到有效固定。通过X线透视见复位满意;固定后冲洗伤口,缝合各层,术毕。骨盆前环骨折脱位不稳定者可根据情况选用切开复位、重建钢板或螺丝钉固定,或者采用外支架固定,通常先作后侧损伤的手术,然后再翻身作前环的手术。但对于前环无骨折,仅为耻骨联合分离者,应先经前路手术治疗。神经损伤通常为挫伤,一般不需要处理,若CT显示有明确的骨片压迫,可经后路同时手术减压治疗。手术时间30~80min,平均45min;术中出血100~400ml,无输血。术中X线暴露时间平均为4min(2~10min)。

1.3 术后功能评定 术后功能评定根据Majeed评分标准^[7],对患者疼痛、坐立情况、性功能、行走需要辅助的情况、行走距离、步态等情况进行评定。总分为80分,评分在78~80分为优,70~77分为良,

60~69分为可,小于60分为差。

1.4 术后康复及功能锻炼 术后当天即可侧卧及半坐,术后第3天即可进行双下肢髋、膝关节主被动功能锻炼,术后2~3周可拄双拐下地行走,3~4个月双下肢可部分负重行走,6个月后可完全负重行走,并逐渐恢复体力劳动。

2 结果

本组9例患者全部得到随访,随访6~21个月,平均为13.8个月。所有患者切口都一期愈合,原有的腰第5神经根及骶丛神经损伤的患者术后3周神经功能开始恢复,腰骶及下肢活动、感觉恢复正常,无会阴部感觉障碍。未发现断钉、骨不连接或骨延迟愈合现象。术后功能评定根据Majeed评分标准,有4例为优,4例为良,1例为可。

3 讨论

3.1 骶骨骨折后路手术方式的优缺点

3.1.1 以往后路主要手术方式的优缺点 骶骨不稳定骨折是指骶骨骨折合并邻近组织损伤导致骨盆稳定性不良者,其固定治疗此前主要有以下方法:骶髂螺丝钉固定术或骶骨棒固定术。骶髂螺丝钉固定术;可用于治疗骶髂关节脱位或Denis I区骶骨骨折。但该手术可引起严重的并发症:置钉不当造成马尾神经或骶神经损伤^[8]。虽然有学者^[9]采取体感诱发电位或连续神经肌电图监测下手术,使神经损伤的发生率有所下降,但仍不能有效地预防导针、钻头或螺钉所致的神经组织损伤^[10]。该术中需要良好的透视设备,且要求术者有扎实的解剖知识和熟练的操作技术。近来采用术中CT监视下或导航系统下置钉,使操作相对容易,但价格昂贵,难以普及。骶骨棒固定术:后路骶骨棒固定手术简单,安全、创伤小。缺点是:(1)过度加压可致骶骨骨折压缩,损伤骶神经;(2)双侧骶髂关节脱位或骨折不能应用;(3)髂骨翼损伤也不能应用。故只适用于Denis I区骨折的治疗。如用于Denis II、Denis III区骨折,骶骨棒的横向加压作用可引起或加重骶神经损伤。

3.1.2 LCP固定骶骨骨折的优缺点 对骶骨骨折,尤其是双侧损伤、伴骶髂关节及临近髂骨损伤;或粉碎性骶骨损伤;或局部软组织损伤较重的情况下采用上述的治疗方法效果差,难以找到一个合适、简便的方法治疗。鉴于LCP作为内支架在四肢骨折的应用效果很好,我们想到将其引入骶骨的固定治疗中,通过临床应用,效果不错。其主要有以下优点:

(1) LCP 固定有内支架的作用,对粉碎性骶骨骨折复位固定时,可维持复位而不产生压缩作用,避免了过度压缩引起神经损伤;(2)骨盆骨为两层较薄的皮质骨中间夹较厚的松质骨组成的“三明治”样结构,且骶骨又是负重的枢纽,不易固定牢固,LCP 因其独特的螺钉锁定及角钢板原理设计,使钢板螺钉形成一体,固定牢固,能够使骶骨骨折得到很好的固定;(3)由于 LCP 有独特的钢板于螺丝钉间的锁定设计,在螺钉固定时仅穿透一侧皮质就能达到有效

固定,在手术中可避免在用普通钢板固定时必须穿透皮质对侧引起神经、血管及内脏损伤的并发症;(4)术中不需反复透视,减少了医生的 X 线的暴露量;(5)骶髂关节脱位伴髂骨翼骨折时往往不能采用髂骨棒固定,采用骶髂螺钉固定时还需加用钢板固定髂骨^[11],但用 LCP 却能很好的固定(图 1A~1E);(6)术中不需要钢板完全贴服,操作简单,手术时间短,损伤小(图 1F~1H),可减少并发症的发生。缺点就是钢板价格昂贵。

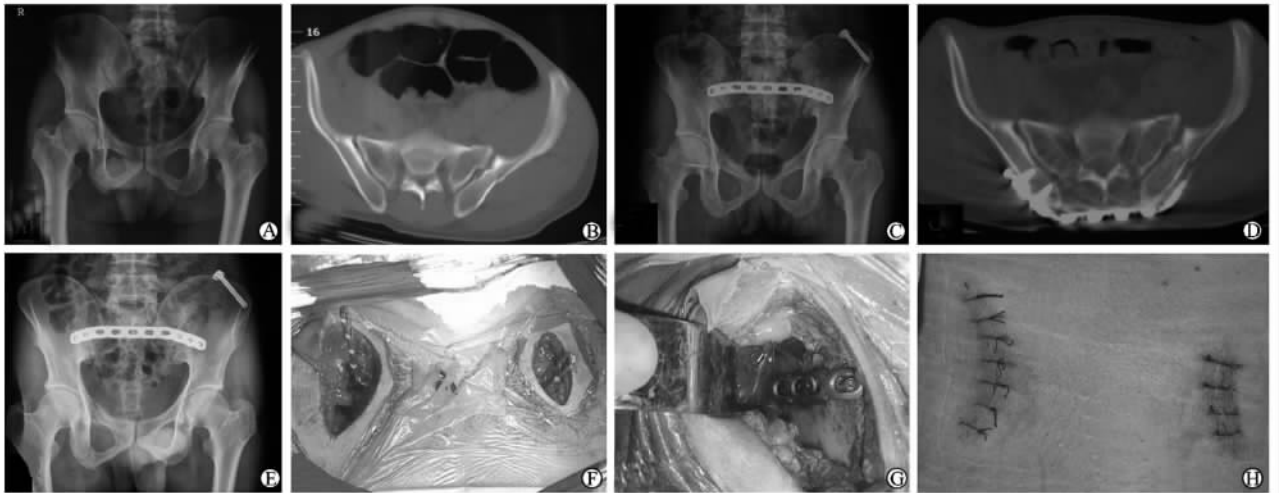


图 1 LCP 固定治疗 C₁ 型骨折

Fig 1 LCP fixation for C₁ type fracture

A: The preoperative X-ray of pelvic fracture; B: The preoperative CT of pelvic fracture; C: The postoperative AP X-ray of pelvic fracture; D: The postoperative CT of pelvic fracture; E: The AP X-ray of pelvic fracture after 6 months of operation; F: Inserting the remodeled plate; G: After fixation; H: The incisions of operation

3.2 手术中的注意事项 通过我们对这 9 例患者的治疗经验来看,我们认为对以下情况可采用 LCP 进行治疗:(1) 骶骨骨折致骨盆不稳,可能继发神经损伤者;(2) 骶骨粉碎性骨折;(3) 双侧骶骨骨折(但一侧髂骨翼完整);(4) 骶骨骨折伴骶髂关节损伤、脱位及骶髂韧带损伤,骨盆不稳者;(5) 骶骨伴髂骨侧部分骨折,合并骶髂韧带损伤不稳者。骨盆前环的处理应该根据骨盆环稳定性来决定,对于骨盆前环损伤重、且骨盆稳定性不佳的患者(如 B₃ 或 C 型骨折损伤),同时固定前环为佳。固定方法可根据情况采用切开复位,重建钢板或螺丝钉固定;对于一般情况差,如尿道、膀胱损伤或阴道等损伤不能切开复位治疗者,也可采用外支架固定前环治疗,效果也不错。本组有 1 例进行了前环固定,患者为 B₃ 型损伤,有尿道膀胱损伤,并在外院作了膀胱造瘘治疗,故我们对其前路采用了外支架固定。神经损伤的治

疗问题争论较大。Zelle 等^[12]认为对神经的挤压损伤,手术干预将促进神经损伤恢复。我们认为对于单纯的神经的挫伤或血肿压迫,术中不需刻意去减压,骨折复位固定后多能恢复。对于 CT 检查有明确的骨片压迫者,应早期术中减压治疗。本组病例均未做神经探查减压治疗,术后神经损伤症状均恢复了,当然与本组病例少,没有遇到严重神经损伤有关。

3.3 LCP 固定的稳定性问题 由于骶骨为“楔石”状结构,将其复位、固定后,重力的影响导致骶骨的“楔石”样下坠,骶骨骨折处会越来越牢固;同时,LCP 独特的角钢板设计原理及弹性材质使之固定后类似于斜拉桥的缆绳,有利于骨盆的稳定;再者,术中对损伤的骶髂后韧带进行了修补,也有利于恢复其稳定性,我们认为稳定性是可靠的。当然,我们采用 LCP 治疗骶骨损伤的病例数较少,时间较短,手

术可能带来的不足及术后稳定性确切的结果还有待于生物力学进一步研究及长期临床观察。

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Potent antitumor efficacy of an E1B 55 kDa-deficient adenovirus carrying murine endostatin in hepatocellular carcinoma

Li G, Sham J, Yang J, Su C, Xue H, Chua D, Sun L, Zhang Q, Cui Z, Wu M, Qian Q (Laboratory of Viral and Gene Therapy, Eastern Hepatobiliary Surgery Hospital, Second Military Medical University, Shanghai 200438, China)

[ABSTRACT] Data from clinical trails have shown that the antitumoral effect of ONYX-015, an E1B 55kDa-deficient adenovirus, as monotherapy is insufficient. To enhance its efficiency, CNHK200-mE, another E1B 55kDa-deficient adenovirus armed with a mouse endostatin gene was constructed and its antitumoral activities against hepatocellular carcinoma (HCC) *in vitro* and *in vivo* were investigated. The selective replication and cytotoxicity of CNHK200-mE in Hep3B and HepGII cells independent of p53 status were confirmed via TCID50 and 3-(4, 5dimethylthiazol)-2, 5-diphenyltetrazolium bromide (MTT) assays. Potent tumor growth suppression on SMMC-7721 xenografts in nude mice was observed and a synergistic effect of the carrier virus and the therapeutic gene was suggested. Moreover, in comparison with the nonreplicative adenovirus carrying the same therapeutic gene, amplified transgene expression of mouse endostatin *in vitro* and *in vivo* were confirmed by Western blotting and ELISA assay. The effective angiogenesis inhibition and replication of CNHK200-mE in nude mice xenografts were demonstrated by immunohistochemistry. In conclusion, the recombinant adenovirus CNHK200-mE is a replication-competent oncolytic virus mediating high expression of therapeutic gene. Because CNHK200-mE is capable of replicating in and lysing HCC cells selectively with effective tumor growth suppression and antiangiogenic activity on HCC xenografts in nude mice, it holds good potential for the treatment of HCC.

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