doi: 10.13241/j.cnki.pmb.2014.21.024

锁定钢板内固定治疗复杂胫骨平台骨折的疗效观察

唐国能 黄粹业 蒋永益 叶维斌 戚日家

（钦州市第二人民医院骨一科 广西 钦州 535000）

摘要 目的:探讨锁定钢板内固定治疗复杂胫骨平台骨折的临床疗效。**方法:**选择 2011 年 2 月 ~2013 年 2 月期间我院收治的复杂胫骨平台骨折 92 例,按照数字随机法分为观察组(50 例)和对照组(42 例)。观察组采用锁定钢板内固定治疗;对照组采用传统钢板固定治疗,所有患者术后随访 1 年以上,观察两组患者临床疗效。**结果:**①两组患者均顺利完成手术,观察组住院时间、骨折愈合时间和完全负重时间显著低于对照组(P<0.05)。②治疗后两组患者胫骨平台后倾角(Posterior tibial angle, PA)、膝关节活动度逐渐升高,内翻角(Tibial plateau angle, TPA)逐渐降低(P<0.05),治疗 6、12 个月观察组 PA、膝关节活动度显著高于对照组,TPA 显著低于对照组(P<0.05)。③所有患者术后随访 1 年,均获得满意随访。观察组膝总有效率为 86.0%;对照组总有效率为 66.7%,观察组膝关节总有效率显著高于对照组(P<0.05)。**结论:**锁定钢板内固定治疗复杂胫骨平台骨折具有固定牢靠,骨折愈合时间短,愈合率高等特点,其临床效果较好。

关键词:胫骨平台骨折;锁定钢板;内固定;膝关节

中图分类号:R683 **文献标识码:**A **文章编号:**1673-6273(2014)21-4095-03

Clinical Observation on Efficacy of Locking Plate Fixation for the Treatment of Eomplex Tibial Plateau Fractures

TANG Guo-neng, HUANG Cui-ye, JIANG Yong-yi, YE Wei-bin, QI Ri-jia

(First department of Orthopedics, Second People's Hospital of Qinzhou, Qinzhou, Guangxi, 535000, China)

ABSTRACT Objective: To investigate the clinical efficacy of locking plate fixation for the treatment of complex tibial plateau fractures. **Methods:** 92 cases of complex tibial plateau fractures in our hospital from February 2011 to February 2013 were selected and randomly divided into observation group (50 cases) and control group (42 cases). The observation group was treated with locking plate internal fixation; the control group used the traditional plate fixation, all patients were followed up for more than 1 year. **Results:** The operation of the patients in 2 groups were all successfully completed ,the hospitalization time, fracture healing time and full weight-bearing time of the observation group were significantly lower than those of the control group (P<0.05). After the treatment,the PA and knee joint activity both gradually increased in the two groups, while the TPA decreased gradually (P<0.05). After 6, 12 months of treatment, PA and the knee joint activity of the observation group are significantly higher than those of control group, while TPA was significantly lower than that of the control group (P<0.05). All patients were followed up for 1 year, which presented satisfactory. The knee joint total efficiency of the observation group was 86% and 66.7% for the control group, between which was a statistically significant difference(P<0.05). **Conclusion:** In the treatment of complex tibial plateau fractures, the locking plate fixation presents shorter fracture healing time, higher healing rate and better clinical effect.

Key words: Tibial plateau fractures; Locking plate; Internal fixation; Knee joint

Chinese Library Classification: R683 Document code: A

Article ID: 1673-6273(2014)21-4095-03

前言

复杂胫骨平台骨折是指胫骨内髁、双髁骨折以及伴有干骺端和骨干分离的平台骨折,是膝关节创伤中较为常见的关节内骨折[1,2]。该骨折类型复杂,且往往伴有膝关节韧带、关节软骨和半月板的损伤,手术难度较大,患者术后并发症和致残率均较高,如治疗不当膝关节功能受到影响[3]。锁定钢板内固定是胫骨平台骨折的常见的固定方法[4]。与传统钢板比较,锁定钢板具有普通钢板和内支架两组功能,能够对关节面进行有效的支撑[5]。为探讨锁定钢板内固定治疗复杂胫骨平台骨折的临床疗效,笔者进行了对照研究,现报到如下。

1 资料和方法

1.1 一般资料

选择 2011 年 2 月 ~2013 年 2 月期间我院收治的复杂胫骨平台骨折患者 92 例,所有患者入院后行小腿正、侧位 X 线、CT 三维重建检查,32 例患者行 MRI 检查。92 例患者按照数字随机法分为观察组和对照组。观察组 50 例,男性 31 例,女性 19 例;年龄 28~70 岁,平均年龄(44.3± 4.7)岁;开放性骨折 7 例,

作者简介:唐国能(1978-),男,本科,主治医师,从事创伤骨科方面的研究,E-mail: 695582337@qq.com

(收稿日期:2014-02-20 接受日期:2014-03-16)

闭合性骨折 43 例;左侧 28 例,右侧 22 例;Schatzker 分型:IV 型 8 例,V 型 31 例,VI 型 11 例。对照组 42 例,男性 24 例,女性 18 例;年龄 26~70 岁,平均年龄(43.2± 4.9)岁;开放性骨折 4 例,闭合性骨折 38 例;左侧 23 例,右侧 19 例;Schatzker 分型:IV 型 6 例,V 型 28 例,VI 型 8 例。两组患者性别、年龄、受伤部位和骨折类型比较无统计学差异(P>0.05),具有可比性。

1.2 方法

观察组患者应用锁定钢板内固定手术治疗,患者平卧位,腰硬联合麻醉,根据骨折位置和伤口情况选择切口,将骨折处显露,并通过撬拔整复对塌陷和分离骨块进行复位,使膝关节面的平整得到恢复,分离的骨折块应用克氏针固定,应用 C 臂 X 线机进行观察,确定骨折端复位良好后选用合适的锁定钢板内固定,术后常规放置引流,缝合切口后加压包扎。对照组患者应用传统暴露钢板治疗,在膝关节内侧做两个切口,首先对膝关节进行解剖复位,复位后应用克氏针固定,然后选择合适 L 形或 T 形钢板固定,术后常规放置引流,缝合切口后加压包扎。两组患者术后常规应用抗生素抗感染预防静脉血栓,早期进行康复训练等[6]。

1.3 随访及疗效判断

所有患者术后随访 1 年,观察两组住院时间、骨折愈合时间和完全负重时间,术后 PA、TPA 和膝关节活动度,治疗 1 年后应用 Rasmussen 评分标准[7]评定患者膝关节功能,包括行走能力、行走疼痛感、稳定性、屈伸活动度等方面,累积得分≥ 27 分为优,20 分≤ 得分≤ 26 分为良,10 分≤ 得分≤ 19 分为中,得分≤ 9 分为差。总有效率 =(优 + 良 + 中)/ 总病例数。

1.4 统计学分析

通过 SPSS15.0 分析与统计,计量资料采用($\bar{x}$± s)来表示,组间比较采用两独立样本的 t 检验,组内不同时间点的比较采用配对 t 检验;计数资料比较采用卡方检验。P<0.05 为差异具有统计学意义。

2 结果

2.1 两组患者手术疗效比较

两组患者均顺利完成手术,观察组住院时间、骨折愈合时间和完全负重时间显著低于对照组(P<0.05)。见表 1。

表 1 两组患者手术疗效比较($\bar{x}$± s, d)

Table 1 Comparison of curative effects of two groups ($\bar{x}$± s, d)

组别 Groups	n	住院时间 Hospital stays	骨折愈合时间 Symphysis time	完全负重时间 Weight bearing time
观察组 Observation group	50	8.2± 2.1	95.2± 20.7	102.8± 30.2
对照组 Control group	42	16.2± 2.8	108.4± 25.2	118.4± 32.8
t		15.259	2.759	2.373
P		0.000	0.007	0.020

2.2 两组患者术后 PA、TPA 和膝关节活动度比较

治疗后两组患者 PA、膝关节活动度逐渐升高,TPA 逐渐降低(P<0.05),治疗 6、12 个月观察组 PA、膝关节活动度显著高于对照组,TPA 显著低于对照组(P<0.05)。见表 2。

表 2 两组患者术后 PA、TPA 和膝关节活动度比较($\bar{x}$ ± s)

Table 2 Comparison of PA, TPA and activity of knee joint after operation between two groups ($\bar{x}$ ± s)

组别 Groups	时间 Time	后倾角(PA) Posterior tibial angle(PA)	内翻角(TPA) Tibial plateau angle(TPA)	活动度 Activity
观察组 Observation group	3 个月 3 months(1)	7.1± 2.1	84.3± 3.4	102.2± 6.5
	6 个月 6 months(2)	8.4± 1.9	82.8± 2.9	110.8± 7.7
	12 个月 12 months(3)	9.5± 2.4	80.8± 2.0	115.5± 8.2
对照组 Control group	3 个月 3 months(4)	7.0± 2.8	85.2± 3.8	100.8± 6.2
	6 个月 6 months(5)	7.5± 2.0	84.2± 2.4	107.2± 7.5
	12 个月 12 months(6)	8.4± 2.4	82.7± 2.5	111.8± 7.8
(2)vs(1)	*T*,*P*	2.553, 0.040	2.507, 0.043	2.708, 0.035
(3)vs(1)	*T*,*P*	2.807, 0.022	2.886, 0.018	2.903, 0.012
(5)vs(4)	*T*,*P*	2.508, 0.043	1.732, 0.088	2.512, 0.044
(6)vs(4)	*T*,*P*	2.556, 0.039	2.882, 0.019	2.807, 0.022
(2)vs(5)	*T*,*P*	2.209, 0.030	2.492, 0.015	2.260, 0.026
(3)vs(6)	*T*,*P*	2.189, 0.031	4.050, 0.000	2.204, 0.030

2.3 两组患者术后 1 年膝关节功能恢复情况

所有患者术后随访 1 年,均获得满意随访。观察组膝关节功能优 20 例,良 13 例,中 10 例,差 7 例,总有效率为 86.0%;对照组膝关节功能优 13 例,良 9 例,中 6 例,差 14 例,总有效率为 66.7%,观察组膝关节总有效率显著高于对照组(x^2= 4.843,P=0.028),见表 3。

表 3 两组患者术后 1 年膝关节功能恢复情况比较

Table 3 Comparison of recovery of knee function of the two groups 1 year post operation

组别 Groups	n	优(n) Optimal (n)	良(n) Good (n)	中(n) Well (n)	差(n) Bad (n)	总有效率[n(%)] Total effective rate[n(%)]
观察组 Observation group	50	20	13	10	7	43(86.0)
对照组 Control group	42	13	9	6	14	28(66.7)

3 讨论

复杂胫骨平台骨折是膝关节创伤中常见的关节内骨折类型,大多由高能量损伤引起,患者胫骨内髁、双髁骨折以及伴有干骺端和骨干分离,骨折类型复杂。尤其是 SehatzkerV、VI 型骨折,往往表现为膝关节面受累的粉碎性骨折,且同时存在塌陷、劈裂、撕脱骨折,半月板、关节软骨和韧带膝关节内部结构损伤等,从而给治疗带来了很大困难[8-10]。目前大多数学者认为[11-13],对于复杂胫骨平台骨折的治疗关键是骨折部位的复位及固定后位置骨折的稳定性。锁定加压钢板是目前临床上常用的内固定技术。该技术是基于经皮微创钢板内固定技术,具有普通钢板和内支架两组功能,能够对骨折部位起到很好的保护作用[14]。由于锁定钢板螺钉和吧、钢板的扣锁能形成合力,从而对关节面形成有效的支撑,固定成功率较高[15]。目前,已有研究表明,锁定钢板内固定治疗胫骨平台骨折效果较好 [16]。而 Jansen H 等[17]研究认为,由于胫骨前区血液供应较差,复杂胫骨平台骨折治疗后可能影响骨折端血液供应,从而导致骨折愈合延迟甚至不愈合,而锁定钢板对骨折端血流供应影响较小,治疗复杂胫骨平台骨折效果较好。

本研究对我院收治的 92 例复杂胫骨平台骨折患者进行了对照研究。观察组应用锁定钢板内固定治疗,对照组应用传统固定技术,结果观察组住院时间、骨折愈合时间和完全负重时间显著低于对照组。表明锁定钢板内固定治疗复杂胫骨平台骨折患者骨折愈合较好,效果较传统固定技术好。这于锁定钢板对骨折端血流供应影响较小有密切关系[18]。从两组患者治疗后关节功能恢复来看,治疗后两组患者 PA、膝关节活动度逐渐升高,TPA 逐渐降低,治疗 3、6、12 个月观察组 PA、膝关节活动度显著高于对照组,TPA 显著低于对照组。表明钢板内固定后患者膝关节活动度恢复情况优于传统钢板固定。笔者分析这可能由于锁定钢板中 raft 排钉技术可以防止胫骨平台塌陷复位后的高度和角度丢失 [19], 而锁定钢板的应用也避免了骨膜的损失,从而有利于患者术后恢复和早期功能锻炼,提高了患者膝关节的活动度[20]。从两组患者治疗 1 年后膝关节恢复情况来看观察组膝关节总有效率显著高于对照组,也证实了锁定钢板内固定治疗复杂胫骨平台骨折的优势。

综上所述,锁定钢板内固定治疗复杂胫骨平台骨折具有固定牢靠,骨折愈合时间短,愈合率高等优点,其临床效果较好,值得临床推广应用。

参 考 文 献(References)

[1] 吕功友, 严征. 锁定钢板治疗胫骨平台复杂性骨折 [J]. 安徽医学, 2013, 34(9): 1343-1344
Lv Gong-you, Yan Zheng. Locking plate treatment of tibial plateau fracture[J]. Anhui Medical Journal, 2013, 34(9):1343-1344

[2] 韩凤旺. 复杂胫骨平台骨折骨锁定钢板内固定 40 例疗效观察[J]. 陕西医学杂志, 2013, 42(8): 1040-1041
Han Feng-wang. The complex fractures of the tibial plateau bone locking plate fixation in 40 cases [J]. Shaanxi m\Medical Journal, 2013, 42(8): 1040-1041

[3] 顾梦臻, 梁朝革, 王奕, 等. 锁定钢板内固定治疗胫骨平台骨折疗效分析[J]. 中国骨与关节损伤杂志, 2013, 28(10): 969-970
Gu Meng-zhen, Liang Chao-ge, Wang Yi, et al. The locking plate fixation in the treatment of tibial plateau fractures[J]. Chinese Journal of Bone and Joint Injury, 2013, 28(10): 969-970

[4] 马建平, 马乾鹏, 李静, 等. 应用钢板内固定治疗成人胫骨平台骨折 62 例临床体会[J]. 宁夏医科大学学报, 2012, 34(8): 838-839
Ma Jian-ping, Ma Qian-peng, Li Jing, et al. Application of plate internal fixation for the treatment of adult tibial plateau fracture in 62 cases [J]. Journal of Ningxia Medical University, 2012, 34(8): 838-839

[5] 赵玉斌, 赵少华. 锁定加压钢板联合钛板法治疗胫骨平台双髁骨折[J]. 西部医学, 2013, 25(8): 1170-1172, 1175
Zhao Yu-bin, Zhao Shao-hua. Treatment of bicondylar tibial plateau fractures by locking compression plate combinated with titanium plate [J]. Medical Journal of West China, 2013, 25 (8): 1170-1172, 1175

[6] Xu YQ, Li Q, Shen TG, et al. An efficacy analysis of surgical timing and procedures for high-energy complex tibial plateau fractures [J]. Orthop Surg, 2013, 5(3): 188-195

[7] 刘志雄. 骨科常用诊断分类方法和功能结果评定标准[M]. 北京: 科学技术出版社, 2005: 125-126
Liu Zhi-xiong. Department of orthopedics commonly used diagnostic classification and evaluation [M]. Beijing: Science and Technology Press, 2005: 125-126

[8] 李林, 蒋亦军, 邓家仁, 等. 锁定钢板内固定治疗复杂胫骨平台骨折临床疗效观察[J]. 海南医学院学报, 2012, 18(7): 932-934
Li Lin, Jiang Yi-jun, Deng Jia-ren, et al. Effect of internal fixation with locking plate on complex tibial plateau fractures [J]. Journal of Hainan Medical University, 2012, 18(7): 932-934

[9] Kini SG, Sathappan SS. Role of navigated total knee arthroplasty for acute tibial fractures in the elderly [J]. Arch Orthop Trauma Surg, 2013, 133(8): 1149-1154

[10] 阮良峰, 马俭凡, 陈源, 等. 外侧入路锁定钢板并植骨治疗胫骨平台三柱骨折的临床探讨[J]. 中国现代医生, 2013, 51(15): 34-36

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[8] Agbenorku P, Agbenorku M, Fiifi-Yankson PK. Pediatric burns mortality risk factors in a developing country's tertiary burns intensive care unit[J]. Int J Burns Trauma, 2013, 3(3): 151-158

[9] Berndtson AE, Sen S, Greenhalgh DG, et al. Estimating severity of burn in children: Pediatric Risk of Mortality (PRISM) score versus Abbreviated Burn Severity Index (ABSI) [J]. Burns, 2013, 39 (6): 1048-1053

[10] Karimi H, Motevalian SA, Rabbani A, et al. Prediction of mortality in pediatric burn injuries: R-baux score to be applied in children (pediatrics-baux score)[J]. Iran J Pediatr, 2013, 23(2): 165-170

[11] Ali MA, Abdellatif AA. Prevention of sevoflurane related emergence agitation in children undergoing adenotonsillectomy: A comparison of dexmedetomidine and propofol [J]. Saudi J Anaesth, 2013, 7(3): 296-300

[12] Oh JN, Lee SY, Lee JH, et al. Effect of ketamine and midazolam on oculocardiac reflex in pediatric strabismus surgery[J]. Korean J Anesthesiol, 2013, 64(6): 500-504

[13] Kim JM, Lee JH, Lee HJ, et al. Comparison of emergence time in children undergoing minor surgery according to anesthetic: desflurane and sevoflurane[J]. Yonsei Med J, 2013, 54(3): 732-738

[14] Cheung YM, Scoones GP, Hoeks SE, et al. Evaluation of the aepEX? monitor of hypnotic depth in pediatric patients receiving propofol-remifentanil anesthesia[J]. Paediatr Anaesth, 2013, 23(10): 891-897

[15] Fudickar A, Smigaj K, Ensenauer R, et al. Effect of propofol and sevoflurane on acid-base balance during pediatric heart catheterization[J]. Minerva Anestesiol, 2013, 79(6): 626-633

[16] 吴明毅, 邢翠燕, 孙玉明, 等. 七氟醚静吸复合麻醉对腹腔镜胆囊切除术中患者应激反应的影响 [J]. 现代生物医学进展, 2010, 10 (20): 3897-3907
Wu Ming-yi, Xing Cui-yan, Sun Yu-ming, et al. Effect of sevoflurane inhalation anesthesia on stress reaction in the elderly patients undergoing laparoscopic cholecystectomy [J]. Progress in Modern Biomedicine, 2010, 10(20): 3897-3907

[17] Kamata K, Hayashi M, Muragaki Y, et al. How to control propofol infusion in pediatric patients undergoing gamma knife radiosurgery [J]. Acta Neurochir Suppl, 2013, 116: 147-150

[18] 贺振秋, 孙建新,于是伶, 等. 小剂量快速注射丙泊酚在胃镜检查中的安全有效性分析[J]. 现代生物医学进展, 2012, 12(28): 5500-5503
He Zhen-qiu, Sun Jian-xin, Yu Shi-ling, et al. Analysis of the Efficacy and Safety on Fast-infusion Propofol in Painless Gastrofiberscopy[J]. Progress in Modern Biomedicine, 2012, 12(28): 5500-5503

[19] Bagaev VG, Amcheslavsky VG, Leonov DI. Xenon and sevoflurane anti stress activity comparative assessment during elective anaesthesia in pediatric patients[J]. Anesteziol Reanimatol, 2013, (1): 7-10

[20] 魏国, 叶博, 范勤, 等. 丙泊酚对过氧化氢诱导人红细胞氧化应激状态下一氧化氮通路的影响 [J]. 现代生物医学进展, 2013, 13(12): 2249-2288
Wei Guo, Ye Bo, Fan Qin, et al. Effects of Propofol on the Erythrocytes Nitric Oxide Pathway under Oxidative Stress Induced by Hydrogen Peroxide in Vitro [J]. Progress in Modern Biomedicine, 2013, 13 (12): 2249-2288

[21] Glatstein MM, Ayalon I, Miller E, et al. Pediatric electrical burn injuries: experience of a large tertiary care hospital and a review of electrical injury[J]. Pediatr Emerg Care, 2013, 29(6): 737-740

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Ruan Liang-feng, Ma Jian-fan, Chen Yuan, et al. The experience of using lateral approached locking plate plus bone grafting for treatment of three column tibial plateau fractures [J]. China Modern Doctor, 2013, 51(15): 34-36

[11] 杨治涛, 葛广勇. 锁定钢板治疗复杂胫骨平台骨折的疗效[J]. 实用骨科杂志, 2013, 19(4): 368-370
Yang Zhi-tao, Ge Guang-yong. Treatment of complex tibial plateau fractures with locking plate effect [J]. Journal of Practical Orthopaedics, 2013, 19(4): 368-370

[12] 王建. 解剖型支持锁定钢板治疗胫骨平台骨折 92 例体会 [J]. 临床合理用药杂志, 2013, 6(11): 88
Wang Jian. Anatomical support locking plate in the treatment of tibial plateau in 92 cases[J]. Chinese Journal of Clinical Rational Drug Use, 2013, 6(11): 88

[13] Ariffin HM, Mahdi NM,Rhani SA, et al. Modified hybrid fixator for high-energy Schatzker V and VI tibial plateau fractures [J]. Strategies Trauma Limb Reconstr, 2011, 6(1): 21-26

[14] Zhu Y, Yang G, Luo CF, et al. Computed tomography-based Three-Column Classification in tibial plateau fractures: introduction of its utility and assessment of its reproducibility [J]. J Trauma Acute Care Surg, 2012, 73(3): 731-737

[15] 徐华, 蔡宇, 李文成, 等. 外侧锁定钢板联合内侧支持钢板与双支持钢板治疗复杂胫骨平台骨折的疗效对比 [J]. 中国老年学杂志, 2013, 33(11): 2554-2556.
Xu Hua, Cai Yu, Li Wen-cheng, et al. Lateral locking plate in treatment of complex tibial plateau fracture of medial support plate and dual plate compared the efficacy [J]. China Journal of Gerontology, 2013, 33(11): 2554-2556

[16] 晏林, 吴雷. 锁定钢板内固定治疗复杂胫骨平台骨折疗效分析[J]. 重庆医学, 2012, 41(30): 3169-3170
Yan Lin, Wu Lei. The analysis of of locking plate fixation of complex tibial plateau fracture [J]. Chongqing Medicine, 2012, 41 (30): 3169-3170

[17] Jansen H, Frey SP, Doht S, et al. Medium-term results after complex intra-articular fractures of the tibial plateau[J]. J Orthop Sci, 2013, 18 (4): 569-577

[18] 杨文彬, 韦财. 锁定钢板内固定治疗复杂性胫骨平台骨折 36 例的疗效分析[J]. 广西医学, 2012, 34(8): 1031-1033
Yang Wen-bin, Wei Cai. The locking plate fixation in the treatment of complex tibial plateau fractures and 36 cases [J]. Guangxi Medical Journal, 2012, 34(8): 1031-1033

[19] 余坤民, 潘斌文. 锁定钢板内固定治疗复杂胫骨平台骨折的临床效果观察[J]. 海南医学, 2012, 23(19): 31-33
Yu Kun-min, Pan Bin-wen. Clinical analysis of locking plate fixation for the treatment of complex tibial plateau fractures [J]. Hainan Medical Journal, 2012, 23(19): 31-33

[20] Lasanianos NG, Garnavos C, Magnisalis E, et al. A comparative biomechanical study for complex tibial plateau fractures: nailing and compression bolts versus modern and traditional plating [J]. Injury, 2013, 44(10): 1333-1339