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倒"L"入路治疗胫骨平台后柱骨折的疗效分析及随访研究*

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摘要 目的:探讨倒"L"入路治疗胫骨平台后柱骨折的疗效、安全性及对膝关节功能的影响。**方法:**纳入 2015 年 8 月至 2019 年 12 月在我院骨科接受手术治疗的 88 例闭合性胫骨平台后柱骨折患者,随机平均分为观察组和对照组各 44 例。观察组采用倒"L"入路术式进行切开复位内固定治疗,对照组采用常规手术入路进行内固定治疗。比较两组患者手术时间、术中出血量、术后住院时间、骨折愈合时间、延迟愈合比例。比较两组患者膝关节功能及并发症情况。**结果:**观察组手术时间短于对照组($P<0.05$),两组患者术中出血量、术后住院时间比较无统计学意义($P>0.05$)。两组患者在愈合时间、延迟愈合比例方面比较无统计学差异($P>0.05$)。观察组膝关节 HSS 评分、Lysholm 评分及 IKDC 评分均高于对照组,差异具有统计学意义($P<0.05$)。两组术后并发症发生率比较差异无统计学意义($P>0.05$)。**结论:**对于胫骨平台后柱骨折的患者,采用倒"L"入路是一种新型的可靠入路方式,与传统术式相比,其对膝关节功能改善更佳,安全可靠。

关键词:倒"L"入路;胫骨平台后柱骨折;膝关节功能;并发症

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Analysis of the Therapeutic Effect and Follow-up Study of Inverted "L" Approach in the Treatment of Posterolateral Tibial Plateau Fractures*

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ABSTRACT Objective: To investigate the effect, safety and influence on knee joint function of posterolateral tibial plateau fractures treated by inverted "L" approach. **Methods:** A total of 88 patients with closed tibial plateau posterior column fractures who underwent surgical treatment in the orthopedics department of our hospital from August 2015 to December 2019 were randomly divided into observation group and control group with 44 cases each. The observation group was treated with open reduction and internal fixation using inverted "L" approach, and the control group was treated with conventional surgical approach for internal fixation. The operation time, intraoperative blood loss, postoperative hospital stay, fracture healing time, and delayed healing ratio were compared between the two groups. The knee joint function and complications were compared between the two groups. **Results:** The operation time of the observation group was shorter than that of the control group ($P<0.05$), and there was no significant difference in the intraoperative blood loss and postoperative hospital stay between the two groups ($P>0.05$). There was no statistical difference between the two groups in healing time and delayed healing ratio ($P>0.05$). The HSS score, Lysholm score and IKDC score of the observation group were higher than those of the control group, and the difference was statistically significant ($P<0.05$). There was no significant difference in the incidence of postoperative complications between the two groups ($P>0.05$). **Conclusion:** For patients with posterolateral tibial plateau fractures, the inverted "L" approach is a new and reliable approach. Compared with the traditional operation, it improves the knee joint function better, and is safe and reliable.

Key words: Inverted "L" approach; Posterolateral tibial plateau fractures; Knee function; Complications

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前言

调查显示,在创伤骨科收治的骨折患者中,胫骨平台后柱

骨折约占 1%~2%,以青壮年男性居多^[1]。胫骨平台作为人体重要的负重结构,周围解剖学复杂,骨折形态各异,给诊断和治疗带来了较大的难度^[2]。对于完全性骨折和移位 >3 mm 的骨折多

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数需要手术治疗。目前传统的单一长切口入路在操作和内固定方面存在一定困难,容易导致术后关节不稳定、关节面塌陷等并发症,业内也一直在寻求不同的入路来解决内固定和恢复解剖结构的难题^[3-6]。近年来有学者提出了采用倒"L"入路方式进行胫骨平台后柱骨折的治疗,取得了不错的效果^[7]。该入路具有显露方便、能够在直视下进行内固定物的置入等优点,获得了相关专家的好评^[8]。但限于该入路提出时间较短,对于患者膝关节功能的稳定性影响有待进一步研究。为此本研究对比分析了新型倒"L"入路方式与传统入路在治疗胫骨平台后柱骨折的疗效及安全性,报道如下。

1 资料与方法

表 1 两组患者基线资料比较

Table 1 Comparison of baseline characteristic between the two groups

Groups	Gender (Male/female)	Age(years)	BMI(kg/m²)	Cause of injury				Schatzker type		Combined injury		
				Traffic injury	Bruise	Fall injury	other	II	III	Anterior Cruciate Ligament Injury	Meniscus injury	Medial collateral ligament injury
Observation group(n=44)	33/11	45.61±9.88	22.13±2.12	18	15	8	3	30	14	6	11	2
Control group(n=44)	32/12	45.79±8.59	22.27±1.99	17	16	9	2	29	15	7	10	2
t/χ²	0.045	0.091	0.319		0.237					0.051		0.461
P	0.831	0.927	0.750		0.846					0.821		0.544

1.2 方法

(1)观察组采用倒"L"入路,麻醉成功后,俯卧位或侧卧位,常规消毒铺巾后,上止血带,压力设置为300 mmHg。采用左膝或右膝后侧倒"L"切口,切口长度15 cm左右(见图1A),逐层切开皮肤、皮下组织后,寻找并保护大隐静脉(见图1B),切开深筋膜,自腓肠肌内侧头的内侧进入后切开腓肌,显露胫骨平台,寻找骨折断端,暴露受损关节面(见图1C),此过程若发现半月板损伤则一期修补半月板;清理骨折断端后复位,克氏针临时固定,C臂透视复位满意后,3.5 mm钛板塑型后斜形置于后外侧,螺钉固定(见图1D)。透视下见复位、内固定物位置良好后,冲洗切口,松止血带,彻底止血。清点器械敷料无误,切口放负压引流管一根,修补关节囊,逐层缝合切口并包扎。术毕。本研究中对合并前交叉韧带损伤、内侧副韧带损伤的患者,发现若不及时修补则影响膝关节稳定性,均给予一期修补术。本研究所使用的钛板及螺钉均由天津正天医疗器械有限公司和苏州欣荣博尔特医疗器械有限公司提供。(2)对照组采用常规入路,硬膜外麻醉成功后,患者取俯卧位、侧卧位或仰卧位,常规消毒、铺巾,上充气止血带300 mmHg。选择后内加前外入路,切口自胫骨外侧踝上缘至胫骨结节下部为起止点,长度约15 cm,控制切口外端长度,避免术中损伤腓总神经;沿髌骨外侧缘切开发节囊,仔细检查骨折处半月板损伤情况,若发现半月板破裂,则及时缝合修补,若半月板未损伤则切开半月板周围软组织,暴露受损关节面;借助骨膜剥离器抬起受损关节面,

1.1 临床资料

纳入标准:①经X线或CT三维重建证实胫骨平台单纯后柱骨折^[9];②美国麻醉医师协会(American Society of Anesthesiologists, ASA)麻醉分级I~II级;③患者及家属知情同意;排除标准:①存在麻醉及手术禁忌症;②合并其他致命性损伤;③患者不同意参加本研究;本研究报请伦理委员会批准。共纳入2015年8月至2019年12月在我院骨科接受手术治疗的88例闭合性胫骨平台后柱骨折患者,随机平均分为观察组和对照组,各44例,两组患者在基线资料方面比较差异无统计学意义($P>0.05$),见表1。

先复位较简单一侧,克氏针临时固定,C臂透视下复位满意后,3.5 cm钛板塑型后斜形置入,螺钉固定;透视见骨折复位满意、内固定可靠后,冲洗切口,松止血带,彻底止血,查无活动性出血,清点器械敷料无误,切口放负压引流管一根,修补关节囊,逐层缝合切口并包扎。术毕。本研究中对合并前交叉韧带损伤、内侧副韧带损伤的患者,发现若不及时修补则影响膝关节稳定性,均给予一期修补术。(3)围手术期处理及并发症处理:术后患肢抬高,密切观察骨折远端肢体血供情况;术后根据参照《骨科常见疼痛处理的专家建议》^[10]和《创伤骨科患者深静脉血栓形成筛查与治疗的专家共识》^[11]进行镇痛和预防深静脉血栓处置;对于发生术后感染的患者拆开缝合口,彻底通畅引流,局部或全身应用抗生素。

1.3 观察指标

(1)围手术期指标:记录两组患者手术时间、术中出血量、术后住院时间;(2)记录两组患者骨折愈合时间、延迟愈合比例;(3)随访12个月,于末次随访时评价膝关节功能:①Lysholm评分^[12]:共8项问题包括跛行程度5分、是否需要支撑物5分、关节有无绞锁15分、关节是否稳定25分、疼痛程度25分、肿胀程度10分、上楼梯困难程度10分和下蹲困难程度5分,满分100分,评分越高表明膝关节功能越好;②(国际膝关节评分委员会,the international knee documentation committee, IKDC)评分^[13]:总分100,分为临床症状(疼痛、肿胀)、日常活动膝关节功能和体育运动影响程度三个部分,评分越高代表

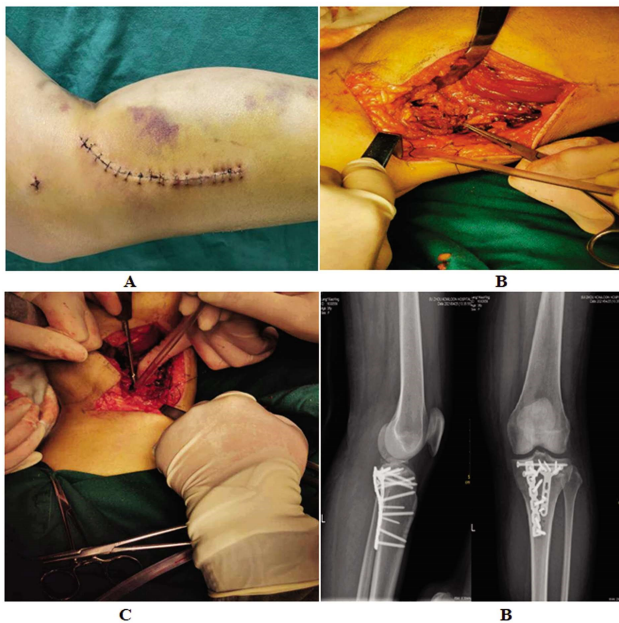


图 1 手术流程图

Fig.1 Operation flow chart

Note: A. Intraoperative incision and drainage tube position; B. Find the great saphenous vein and protect the common peroneal nerve; C. Find the articular surface; D. Postoperative X-ray examination of the titanium plate.

膝关节功能越好;④ 美国膝关节外科学会(HSS)评分^[14],包括疼痛(30分)、功能(22分)、活动度(18分)、肌力(10分)、屈曲畸形(10分)、稳定性(10分),满分100分,得分越高说明膝关节功能越好;(4)记录两组患者术后出现切口感染、膝关节强直、内固定物松动/断裂、骨折移位、膝关节不稳定等并发症情况。

表 2 两组患者围手术期指标比较($\bar{x} \pm s$)

Table 2 Comparison of perioperative indicators between the two groups ($\bar{x} \pm s$)

Groups	Operation time(min)	Intraoperative blood loss(mL)	Postoperative hospital stay(d)
Observation group(n=44)	118.95±23.77	315.74±29.46	10.91±2.33
Control group(n=44)	133.58±21.39	320.77±34.52	10.77±2.55
t	3.035	0.735	0.269
P	0.003	0.464	0.789

表 3 两组患者骨折愈合情况比较

Table 3 Comparison of fracture healing between the two groups

Groups	Healing time($\bar{x} \pm s$, month)	Delayed healing[n(%)]
Observation group(n=44)	5.23±1.44	3(6.82)
Control group(n=44)	5.34±1.29	4(9.09)
χ^2/t	0.377	0.000
P	0.707	1.000

3 讨论

胫骨平台后柱骨折多发育青中年男性,男女比例约为3:1,对于存在移位>3mm或塌陷的骨折多需要进行手术治疗^[15-17]。稳定的内固定、骨折断端充足的血液供应是骨折术后治疗的一

1.4 统计学处理

采用SPSS20.0软件进行数据分析,符合正态分布的计量资料采用均数±标准差表示,组间比较采用t检验;计数资料采用例/百分比表示,组间比较采用卡方检验; $P<0.05$ 时差异具有统计学意义。

2 结果

2.1 两组患者围手术期指标比较

观察组手术时间短于对照组($P<0.05$),两组患者术中出血量、术后住院时间比较无统计学意义($P>0.05$),见表2。

2.2 两组患者骨折愈合情况比较

两组患者在术后3~7个月内均获得良好的骨性愈合,在愈合时间、延迟愈合比例方面比较无统计学差异($P>0.05$),见表3。

2.3 两组患者随访膝关节功能比较

所有患者均获得12个月的随访,无失访病例,末次随访评估膝关节功能,观察组膝关节HSS评分、Lysholm评分及IKDC评分均高于对照组,差异具有统计学意义($P<0.05$),见表4。

2.4 两组患者术后并发症比较

两组患者术后复查时均未出现内固定物松动、骨折移位情况,其中观察组出现4例膝关节强直,2例经评估定位膝关节不稳定,术后并发症发生率为13.64%(6/44);对照组出现5例膝关节强直,2例经评估定位膝关节不稳定,术后并发症发生率为15.91%(7/44)。组间术后并发症发生率比较差异无统计学意义($\chi^2=0.090$, $P=0.764$)。

贯原则。既往针对胫骨平台后柱骨折的手术治疗方式多为前外侧或前内侧入路,且为长直切口,具有操作简便,无需掀起软组织瓣,可避免损伤腓总神经;但存在显露困难、复位和内固定物错位等情况,特别是后外侧胫骨平台发生骨折后,最终易导致术后关节面再次塌陷、移位,后期出现膝关节不稳定和行走痛

表 4 两组患者膝关节功能评分比较($\bar{x} \pm s$)Table 4 Comparison of knee function scores between the two groups($\bar{x} \pm s$)

Groups	Lysholm score	IKDC score	HSS score
Observation group(n=44)	88.92±13.71	74.25±10.92	85.33±9.22
Control group(n=44)	81.25±10.36	68.55±8.71	80.34±7.84
t	2.961	2.707	2.735
P	0.004	0.008	0.007

的后遗症^[18,19]。因此,目前针对后外侧胫骨平台的手术入路是业内研究的热点。

单纯的后外侧切口对于骨折断端显露和内固定物置入存在难以克服的缺点,术中操作较为困难。腓骨头会起到阻碍作用^[20-22];而本研究中采纳的倒"L"入路方式与传统入路进行对比分析后显示,观察组手术时间短于对照组,且术后12个月随访时观察组膝关节HSS评分、Lysholm评分及IKDC评分均高于对照组评分,提示膝关节功能由于对照组,说明倒"L"入路具有可缩减患者时间,利于患者术后膝关节功能恢复,与业内相关研究报道结论相符^[23-26]。可能原因为:(1)倒"L"入路能够获得更好的手术视野,切入方式取腓肌-比目鱼肌间隙,操作起来更为简便;(2)能够有效保护腓总神经和腓血管,减少了血管、神经损伤的几率;(3)解剖复位更彻底,特别是对于塌陷处能够进行充分植骨,塑型钢板置入更简便,更易达到牢固内固定;(4)术后早期可进行膝关节的非负重训练,尽早恢复正常的膝关节活动度。对两组安全性评价结果显示,两组患者术后并发症发生率组间比较差异无统计学意义,表明两种入路在胫骨平台后柱骨折中的安全性无显著差异,可能的原因为纳入的量表量较小,纳入的患者为中青年患者,术后恢复能力好有关。本次研究总结手术经验,得出了一下几点进行倒"L"入路的要求,供业内参考:(1)术前能够行CT三维重建的医院建议行三维重建,根据三柱分型理论设计手术方案;(2)术中注意仔细游离小腿外侧皮神经、腓肠神经和腓总神经,避免损伤;(3)因胫前动脉从腓动脉处发出,L切口短边尽量不超过4cm,术中尽量选择体积较小的钢板内固定。

综上所述,本研究着重对比了倒"L"入路和传统的入路在治疗胫骨平台后柱骨折中的效果,得出倒"L"入路手术方式对膝关节功能恢复更理想,可缩短手术时间,对于改善膝关节功能较传统入路更优,安全可靠;但限于样本量限制,后期还需扩大样本量,延长随访时间以获得更有意义的临床数据。

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