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· 临床研究 ·

前交叉韧带重建术股骨止点定位的治疗原则与临床效果研究*

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摘要 目的:探讨前交叉韧带重建术股骨止点定位的治疗原则与临床效果。**方法:**选取 2011 年 9 月~2013 年 1 月在我院开展关节镜下前交叉韧带重建术的 38 例患者的临床治疗,观察术后治愈情况及不同临床结果下股骨止点定位的差异。**结果:**38 例患者未出现重建失败病例,无翻修手术。手术前后对患者进行 Lysholm 评分与 Tegner 运动评级,发现术后患者 Lysholm 与 Tegner 评分均显著高于术前,有显著差异,具有统计学意义($P<0.05$)。根据患者临床疗效的不同,分为治疗满意组 27 例,不满意者 11 例,观察两种手术结果的股骨止点定位情况发现满意组股骨止点位置为($67.32\%\pm 6.53\%$),不满意组为($61.39\%\pm 5.86\%$),两组数值差异显著,具有统计学意义($P<0.05$)。**结论:**股骨止点定位对术后患者膝关节能力的恢复有重要作用,前交叉韧带重建术中保证股骨止点定位的有效性对患者临床治疗有显著效果。

关键词: 前交叉韧带重建术;股骨止点;隧道定位

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Study on Treatment Principles and Clinical Effects of Anterior Cruciate Ligament Reconstruction of the Femur and Ending Point Positioning*

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ABSTRACT Objective: To investigate the treatment principles and clinical effects of anterior cruciate ligament reconstruction of the femur and ending point positioning. **Methods:** 38 patients who were conducted the arthroscopic anterior cruciate ligament reconstruction in our hospital from September 2011 to January 2013 were selected, and the differences in cure and postoperative clinical outcomes under different positioning of the femoral dead after the surgery were observed. **Results:** No rebuild failure or revision surgery appeared. Lysholm score and Tegner sports ratings were carried out before and after the surgery. The scores of the post-operative Lysholm and Tegner were significantly higher than before with statistically significant differences ($P<0.05$). According to the clinical outcomes, the patients were divided into the satisfied group ($n=27$) and dissatisfied group ($n=11$). The femur ending point position of the satisfied group was (67.32 ± 6.53)%, while in the dissatisfied group was (61.39 ± 5.86)%, and the differences were statistically significant between two groups ($P<0.05$). **Conclusion:** The ending point positioning of the femur has a great impact on clinical effect and is conducive to the postoperative recovery of knee joint ability. The efficacy of femoral ending point position in anterior cruciate ligament reconstruction is helpful to the improvement of clinical treatment effect.

Key words: Anterior cruciate ligament reconstruction; Dead femur; Tunnel positioning

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前言

前交叉韧带(anterior cruciate ligament, ACL)损伤是常见且较为严重的膝关节损伤之一。随着我国竞技体育水平的提高和群众性体育运动的广泛开展,运动创伤中发生的膝关节 ACL 损伤日益增多,且多合并内侧副韧带、内侧半月板的损伤^[1-3]。关节镜下前交叉韧带重建术是目前治疗 ACL 断裂的主要方

法,具有创伤小、恢复快、疗效确切、并发症少等优点,但手术精确程度要求较高,即便较小的偏差也会对手术的效果产生影响^[4,5]。定位骨髓道出口是 ACL 重建术中的关键步骤,股骨止点定位在手术中有重要意义^[6-8]。本次研究通过对开展重建术的 38 例前交叉韧带损伤患者的临床资料进行回顾性分析,讨论前交叉韧带重建术股骨止点定位的治疗原则与临床效果,为临床治疗 ACL 损伤提供指导和建议。

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1 资料与方法

1.1 临床资料

选取 2011 年 9 月~2013 年 1 月我院收治并开展前交叉韧带重建手术的前交叉韧带损伤患者 38 例, 选取样本术中都对螺钉的固定。其中男性 27 例, 女性 11 例; 年龄 17~52 岁, 平均年龄(30.4 ± 2.7)岁; 左侧 21 例, 右侧 17 例; 病程 7 天~8 年, 平均病程(5.9 ± 2.8)个月; 运动伤 20 例, 高处坠落 8 例, 交通伤 7 例, 其他伤害 3 例。所有患者经临床物理检查及 MRI 检查诊断为前交叉韧带损伤, 术前依据 Lysholm 评分和 Tegner 运动评级观察患者情况。

1.2 方法

具体手术过程如下: ①术前行椎管内麻醉或者全身麻醉, 待麻醉后对患者的前抽屉进行 Lachman 实验、轴移试验及侧方松弛度。开展常规关节镜检查选择前外侧或前内测的人路方式, 查看患者半月板损伤和软骨损伤情况, 采取处理措施。对半月板损伤病人开展关节镜下缝合修补、部分切除或全切除。②检查前交叉韧带的情况, 清楚前交叉韧带断端, 将关节镜取出, 在髌骨下极内侧作直切口, 切口大小以准确显露髌骨下极、完整髌腱、胫骨结节为准。以髌腱的 1/3 宽度在胫骨结节与髌骨下极处切取归块 $25 \text{ mm} \times 10 \text{ mm}$ 。利用直径为 10 mm 的套管开展滑动对直径测试, 对归块进行修整。将两端的骨块穿缝线, 与腓骨的结合位置做标记。③将关节镜再次放入, 股骨止点定位在外侧髁内壁接近过顶位, 以髁间窝顶部做表盘时针定位法, 左膝定位 1 点, 右膝定位 11 点, 膝关节屈曲 90° , 钻入定位导

针, 依据移植植物大小, 钻出深度为 25 mm~30 mm 的隧道, 髁间窝顶部与隧道后壁留置 1~2 mm, 利用探测器开展骨隧道长度测量。在关节镜下观察移植植物进入股骨隧道的情况。④术后对患者使用支具固定 6 周, 待疼痛感逐渐减弱后增加直腿抬高肌力康复运动, 引流管拔除后可开展适量的活动度训练运动。3~4 个月后酌情开展慢跑、散步等有氧运动, 6 个月后可开展正常体育活动。

1.3 观察指标

患者出院后开展 6 个月~3 年的定期随访, 依据 Lysholm 评分和 Tegner 运动评级对患者膝关节的恢复情况进行平均。术后及随访时均对患者开展 X 线检查, 采用 Photoshop Element6.0 软件作为测量工具, 测量股骨髁间窝顶线 (Blumensaat 线) 指标, 以百分比表示相对位置。

1.4 统计学方法

利用 SPSS 11.0 统计学软件来处理相关的数据, 分析和处理, 用均数 $\pm$ 标准差 ($\bar{x} \pm s$) 表示, 组间采用 t 检验。以 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 治疗效果

手术前后对患者开展的 Lysholm 评分与 Tegner 运动评级的具体情况详见表 1。38 例患者未出现重建失败病例, 无翻修手术。手术后患者的 Lysholm 评分与 Tegner 评分均显著高于术前, 有显著差异, 具有统计学意义 ($P < 0.05$)。

表 1 手术前后 Lysholm 与 Tegner 评分情况 ($\bar{x} \pm s$)

Table 1 Scores of the Lysholm and the Tegner of patients before and after the surgery ($\bar{x} \pm s$)

	Cases	Lysholm score	Tegner score
Preoperative	38	41.89 ± 13.67	1.83 ± 0.78
Postoperative	38	83.76 ± 9.51	4.35 ± 1.13
t	-	15.50	11.31
P	-	< 0.05	< 0.05

2.2 股骨止点定位情况

根据患者临床疗效的不同, 分为治疗满意组 27 例, 不满意者 11 例, 观察两种手术结果的股骨止点定位情况, 满意组股骨

止点位置为 (67.32 ± 6.53)%, 不满意组为 (61.39 ± 5.86)%, 两组数值差异显著, 具有统计学意义 ($P < 0.05$)。

表 2 不同临床结果的股骨止点定位情况 ($\bar{x} \pm s$)

Table 2 Femoral ending point positioning of patients with different clinical outcomes

Group	Cases	Femoral ending point position (%)	P
Satisfied group	27	67.32 ± 6.53	< 0.05
Dissatisfied group	11	61.39 ± 5.86	

3 结论

3.1 股骨止点定位的临床原则

股骨止点定位主要有关节镜下定位法和透视定格定位法。

关节镜下可采用髁间窝表盘时针定位法, 在关节镜下, 将表平面设置为髁间窝后缘平面, 利用始终位置来对股骨止点定

位并标记。Woo 等^[9-11]开展关节镜下前交叉韧带重建术, 以右膝 11 点为定位标准开展手术, 获得较好的稳定性恢复。赵斌等^[12,13]的研究中股骨定位与右膝 10 到 11 点, 左膝 1 到 2 点, 手术效果较好。关节镜下还可采用 Mochizuki 法, 以股骨止点的中心点作为髁间窝的顶线平行线, 股骨止点中心点到髁皮表面的距离为 mL, 中心线到髁前后皮表明的距离为总长度 m, 以

mL/m 的百分比表示。Takahashi 法是通过股骨外髁前缘顶点到前交叉韧带股骨止点的中线点开展连线后延长至后髁皮表明的长度为 p , 股骨止点到后髁皮表明的长度为 p_1 , 以 p_1/p 的百分比表示^[14,15]。

透视定格定位法中包括四格法和 Amis 法。四格法又称象限法, 是以股骨外侧髁前后缘交点到髁间窝顶线的距离视为 Blumensaat 线的长度为 t , 利用前后缘交点做垂直线, 再由股骨髁后下方处做与 Blumensaat 线平行的髁间窝顶切线, 形成矩形后, 在矩形内部做垂直线形成 16 方格, 移植股骨止点与 Blumensaat 线的距离为 a , 股骨髁间窝顶切线至 Blumensaat 线距离为 h , 股骨髁间窝顶线到股骨止点的处置距离为 b 。Amis 法是指在膝关节侧位片上作与股骨外髁后方相重叠的同心圆, 做此圆的直径线并使之与 Blumensaat 线平行, 来测量 ACL 股骨隧道中心点在此线上的位置^[16,17]。

3.2 股骨止点定位对临床效果的影响

人体膝关节的活动中, 前交叉韧带不同纤维束保持整体的恒定张力, 保证膝关节活动的稳定性和正常负荷能力^[18,19]。前交叉韧带内正常伸屈范围内股骨止点的距离具有等距特性, 这也是前交叉韧带重建手术的核心任务^[20]。本次研究结果表明, 股骨止点定位对手术后患者膝关节能力的恢复有促进作用, 重建术中保证股骨止点定位的有效性对患者临床治疗有显著效果。股骨定位不当会破坏韧带重建的等距特性, 导致膝关节活动时移植产生异常应力, 使移植变得松弛, 患者关节活动受限。本次研究结果显示, 疗效较好的患者股骨止点定位在 Blumensaat 线上距离该线前缘相对距离较大, 表示股骨止点定位使股骨髁间窝顶后方效果更好, 偏前方的效果不佳。

综上所述, 股骨止点的合理定位对开展前交叉韧带重建术的患者有重要意义, 可以保证患者的治疗效果, 促进术后膝关节功能的恢复。

参考文献(References)

- [1] 李嗣著. 关节镜下前交叉韧带重建术 32 例围手术期护理及康复训练[J]. 中国全科医学, 2010, 13(14):1574-1575
Li Si-jing. Perioperative Nursing of 32 Cases Enduring Arthroscopic Anterior Cruciate Ligament Reconstruction Surgery[J]. Chinese General Practice, 2010, 13(14):1574-1575
- [2] 何榕真, 吴松, 曹旭, 等. 关节镜下前交叉韧带重建术后早期康复训练研究[J]. 现代生物医学进展, 2012, 12(7): 1274-1276, 1269
He Rong-zhen, Wu Song, Cao Xu, et al. Therapeutic Effect of Early Rehabilitative Training after Arthroscopic Anterior Cruciate Ligament Reconstruction [J]. Progress in Modern Biomedicine, 2012, 12 (7): 1274-1276, 1269
- [3] Cox CL, Spindler KP, Leonard JP, et al. Do Newer-Generation Bioabsorbable Screws Become Incorporated into Bone at Two Years After ACL Reconstruction with Patellar Tendon Graft: A Cohort Study [J]. J Bone Joint Surg Am, 2014, 96(3): 244-250
- [4] 董伊隆, 蔡春元, 姜刚毅, 等. 前交叉韧带股骨侧移植物的止点和角度对术后膝关节功能的影响[J]. 中国骨伤, 2012, 25(11): 895-898
Dong Yi-long, Cai Chun-yuan, Jiang Gang-yi, et al. Clinical study on the effects of the femoral attachment site of grafts and the tunnel angle on the function of knee joint after anterior cruciate ligament reconstruction [J]. China Journal of Orthopaedics and Traumatology, 2012, 25 (11): 895-898
- [5] 陈君洁, 梁峭嵘, 刘照宏, 等. 高频超声膝关节前交叉韧带损伤分级诊断与关节镜对比研究 [J]. 中国中西医结合影像学杂志, 2012, 10 (4): 314-315
Chen Jun-jie, Liang Qiao-rong, Liu Zhao-hong, et al. Comparison of high-frequency ultrasonography and arthroscopy in the classification of anterior cruciate ligament injuries in knee joint[J]. Chinese Imaging Journal of Integrated Traditional and Western Medicine, 2012, 10(4): 314-315
- [6] 陆伟, 王大平, 肖德明, 等. 前交叉韧带重建股骨足迹精确定位的解剖与临床研究[J]. 中国临床解剖学杂志, 2011, 29(5): 513-516
Lu Wei, Wang Da-ping, Xiao De-ming, et al. Anatomy and clinical investigation on the pinpoint of footprint in the in-situ anterior cruciate ligament reconstruction [J]. Chinese Journal of Clinical Anatomy, 2011, 29(5): 513-516
- [7] 郝玉彬, 赵力, 赵金岩, 等. 前交叉韧带损伤肌腱移植起止点骨隧道的临床体会[J]. 中外健康文摘, 2012, (32):63-64
Hao Yu-bin, Zhao Li, Zhao Jin-yan, et al. Clinical study on position of the bone tunnels for anterior cruciate ligament reconstruction[J]. World Health Digest, 2012, (32):63-64
- [8] Kiapour AM, Murray MM. Basic science of anterior cruciate ligament injury and repair[J]. Bone Joint Res, 2014, 3(2): 20-31
- [9] Woo SL, Kanamori A, Zeminski J, et al. The effectiveness of reconstruction of the anterior cruciate ligament with hamstrings and patellar tendon. A cadaveric study comparing anterior tibial and rotational loads[J]. J Bone Joint Surg Am, 2002, 84(6):907-914
- [10] Vermesan D, Prejbeanu R, Laitin S, et al. Meniscal tears left in situ during anatomic single bundle anterior cruciate ligament reconstruction[J]. Eur Rev Med Pharmacol Sci, 2014, 18(2):252-256
- [11] Boguszewski D, Tomaszewska I, Adamczyk JG, et al. Evaluation of effectiveness of kinesiology taping as an adjunct to rehabilitation following anterior cruciate ligament reconstruction Preliminary report [J]. Ortop Traumatol Rehabil, 2013, 15(5): 469-478
- [12] 赵斌, 邢更彦, 刘运晃, 等. ACL 重建股骨隧道定位及固定方法研究[J]. 实用骨科杂志, 2009, 15(7): 502-506
Zhao Bin, Xing Geng-yan, Liu Yun-huang, et al. Positioning of the Femoral Tunnel and Fixation in Anterior Cruciate Ligament Reconstruction with Arthroscop [J]. Journal of Practical Orthopaedics, 2009, 15(7): 502-506
- [13] 张抒, 陈晨, 张军, 等. 前交叉韧带重建术保留残端韧带的方法及意义[J]. 中国骨与关节杂志, 2013, (9):522-525
Zhang Shu, Chen Chen, Zhang Jun, et al. Technique and significance of anterior cruciate ligament reconstruction with ligament remnants preserved [J]. Chinese Journal of Bone and Joint, 2013, (9):522-525
- [14] 傅永慧, 许正文. 自体骨—髌腱—骨前交叉韧带重建术后胫骨隧道的变化[J]. 山东医药, 2012, 52(10): 8-10
Fu Yong-hui, Xu Zheng-wen. Changes of tibial tunnel enlargement after anterior cruciate ligament reconstruction with bone-patellar-bone from autograft[J]. Shandong Medical Journal, 2012, 52(10): 8-10
- [15] Harris JD, Erickson BJ, Bach BR Jr, et al. Return-to-Sport and Performance After Anterior Cruciate Ligament Reconstruction in National Basketball Association Players [J]. Sports Health, 2013, 5 (6): 562-568

- Lu Yuan-hua, Liu Ling, Qiu Xiao-hua, et al. Effect of EGDT on tissue perfusion in patients with septic shock[J]. Chinese Journal of Emergency Medicine, 2013, 22(4):346-351
- [5] Boyd J H, Forbes J, Nakada T A, et al. Fluid resuscitation in septic shock a positive fluid balance and elevated central venous pressure are associated with increased mortality [J]. Crit Care Med, 2011, 39(2): 259-265
- [6] Deborah C. Silverstein, Jennifer Kleiner, Kenneth J. Drobatz, et al. Effectiveness of intravenous fluid resuscitation in the emergency room for treatment of hypotension in dogs: 35 cases (2000-2010)[J]. Journal of Veterinary Emergency and Critical Care, 2012,22(6):245-247
- [7] Maitland K, Kiguli S, Opoka R O, et al. Mortality after fluid bolus in African children with severe infection [J]. N Engl J Med, 2011, 364 (26): 2483-2495
- [8] Harvey Greg, Foster Gary, Manan Asmaa, et al. Factors affecting pediatric isotonic fluid resuscitation efficiency: a randomized controlled trial evaluating the impact of syringe size [J]. BMC emergency medicine, 2013, 13(9):14
- [9] Jones A E, Shapiro N I, Trzeciak S, et al. High mixed venous oxygen saturation levels do not exclude fluid responsiveness in critically ill septic patients [J]. Crit Care, 2011, 15(4) :177
- [10] Zlem zdemir, Birol Baytan, Metin Demirkaya, et al. The Value of C-Reactive Protein and Procalcitonin in Febrile Neutropenia [J]. Gü ncel Pediatri, 2009, 7(1):7
- [11] Ashraf Abd El Halim, Adel Attia, Taysser Zytoun, et al. The Diagnostic and Prognostic Value of Serum Procalcitonin among Ventilator Associated Pneumonia Patients [J]. Open Journal of Respiratory Diseases, 2013, 3(2):73-78
- [12] Phillip R D, Carlet J M, Masur H, et al. Surviving Sepsis Campaign International guidelines for management of severe sepsis and septic shock 2008[J]. Intensive Care Med , 2008, 34(5):17-60
- [13] 杜鹏飞, 朱海彬, 赵会民, 等. 不同补液强度对重度失血性休克早期血清乳酸及钾的影响[J]. 中国急救医学, 2013, 33(5):462-464
Du Peng-fei, Zhu Hai-bin, Zhao Hui-min, et al. Impact of different rehydration intensity on serum lactate and potassium at the early stage of severe hemorrhagic shock [J]. Chinese Journal of Critical Care Medicine, 2013, 33(5): 462-464
- [14] 王梅. 限制性液体复苏在创伤失血性休克中的临床应用 [J]. 中国中西医结合急救杂志, 2010, 17(1):31-33
Wang Mei. Clinical application of limited fluid resuscitation in treatment of patients with traumatic hemorrhagic shock [J]. Chinese Journal of Integrated Traditional and Western Medicine in Intensive and Critical Care, 2010, 17(1): 31-33
- [15] Hwa Jin Cho, Young Earl Choi, Eun Song Song, et al. Procalcitonin Levels in Patients with Complete and Incomplete Kawasaki Disease [J]. Disease Markers, 2013, 35 (5):49-52
- [16] Indira Chivukula, Paul K. Marx, Kamaraju S, et al. Ratnakar. Serum Procalcitonin and Neutrophil Toxic Granules Guided Management of Post-Operative <i>K. pneumoniae</i> Septic-Shock in Laminectomy-A Case Report [J]. Advances in Infectious Diseases, 2012, 2(3): 72-75
- [17] Sandeep Sharma, Mridula Pawar, Mohandeep Kaur, et al. Effect of Higher Mean Arterial Pressure with Norepinephrine on Tissue Oxygenation and Perfusion in Patients of Septic Shock [J]. International Journal of Clinical Medicine, 2012, 3(5): 407-410
- [18] Sylvia Brinkman, Ferishta Bakhshi-Raiez, Ameen Abu-Hanna, et al. External validation of Acute Physiology and Chronic Health Evaluation IV in Dutch intensive care units and comparison with Acute Physiology and Chronic Health Evaluation II and Simplified Acute Physiology Score II[J]. Journal of Critical Care, 2011, 26(1):11-105
- [19] Oliveira Vanessa M de, Brauner Janete S, Rodrigues Filho Edison, et al. Is SAPS 3 better than APACHE II at predicting mortality in critically ill transplant patients [J]. Clinics (S o Paulo, Brazil), 2013, 68(2): 153-158
- [20] Constantine J. Karvellas, Fred Pink, Mark McPhail, et al. Bacteremia, Acute Physiology and Chronic Health Evaluation II and Modified End Stage Liver Disease are independent predictors of mortality in critically ill nontransplanted patients with acute on chronic liver failure[J]. Critical Care Medicine, 2010, 38(1): 121-126
- (上接第 3268 页)
- [16] Klos TV, Harman MK, Habets RJ, et al. Locating femoral graft placement front lateral radiographs in anterior cruciate ligament reconstruction: a comparison of 3 methods of measuring radiographic images[J]. Arthroscopy, 2000, 16(5): 499-504
- [17] 辛海霞, 段元君, 张晓霞, 等. 关节镜下前交叉韧带重建患者的护理[J]. 解放军护理杂志, 2012, 29(3): 43-45
Xin Hai-xia, Duan Yuan-jun, Zhang Xiao-xia, et al. Nursing after Anterior Cruciate Ligament Reconstruction Surgery under Arthroscopy [J]. Nursing Journal of Chinese People's Liberation Army, 2012, 29(3): 43-45
- [18] 涂庆生, 程建斌, 吴康盛, 等. 关节镜下前交叉韧带重建术治疗前交叉韧带断裂的临床研究 [J]. 中国当代医药, 2013, 20(29): 183-185
Tu Qing-sheng, Cheng Jian-bin, Wu Kang-sheng, et al. Clinical research on anterior cruciate ligament reconstruction by arthroscopy for anterior cruciate ligament rupture [J]. China Modern Medicine, 2013, 20(29): 183-185
- [19] Lee JC, Kim JY, Park GD. Effect of 12 Weeks of Accelerated Rehabilitation Exercise on Muscle Function of Patients with ACL Reconstruction of the Knee Joint [J]. J Phys Ther Sci, 2013, 25(12): 1595-1599
- [20] Parchi PD, Gianluca C, Dolfi L, et al. Anterior cruciate ligament reconstruction with LARS artificial ligament results at a mean follow-up of eight years[J]. Int Orthop, 2013, 37(8):1567-1574