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关节镜下前交叉韧带重建术的手术时机对患者膝关节功能恢复的影响*

汤义民 陶 钧[△] 董 斌 许克庆 陈小虎

(安徽理工大学第一附属医院 / 淮南市第一人民医院骨科 安徽 淮南 232000)

摘要 目的:研究关节镜下前交叉韧带(ACL)重建术的手术时机对患者膝关节功能恢复的影响。**方法:**选取 2016 年 1 月至 2017 年 8 月我院收治的膝关节 ACL 损伤患者 65 例为研究对象,所有患者均接受关节镜下 ACL 重建术治疗,并按照患者受伤至接受手术的时间分为研究组($n=35$,受伤至接受手术的时间 ≤ 3 周)和对照组($n=30$,受伤至接受手术的时间 >3 周),术后对患者进行为期 6 个月的随访,对比两组患者术前和术后 6 个月的膝关节活动度、膝关节功能以及 ACL 恢复情况,并比较随访期间两组并发症发生情况。**结果:**术前,两组膝关节活动度、国际膝关节文献委员会膝关节评估表(IKDC)和 Lysholm 膝关节评分比较差异无统计学意义($P>0.05$),术后 6 个月,两组膝关节活动度、IKDC 评分和 Lysholm 膝关节评分均较术前升高,且研究组高于对照组,差异有统计学意义($P<0.05$)。术前与术后 6 个月,两组前抽屉(ADT)试验和 Lachman 试验阴性率比较差异无统计学意义($P>0.05$),但与术前比较,术后 6 个月两组 ADT 试验和 Lachman 试验阴性率均升高,差异有统计学意义($P<0.05$)。与对照组比较,研究组并发症总发生率降低,差异有统计学意义($P<0.05$)。**结论:**膝关节 ACL 损伤患者在不同时间内接受关节镜下 ACL 重建术治疗均具有较好的效果,但是在受伤后 3 周内接受手术对患者膝关节功能恢复效果更明显,同时并发症发生率也相对更低。

关键词:前交叉韧带;重建术;关节镜;手术时机;膝关节功能

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Effect of Operation Time on Knee Joint Function Recovery in Patient Undergone Arthroscopic Anterior Cruciate Ligament Reconstruction*

TANG Yi-min, TAO Jun[△], DONG Bin, XU Ke-qing, CHEN Xiao-hu

(Department of Orthopedics, The First Affiliated Hospital of Anhui University of Science and Technology/Huainan First People's Hospital, Huainan, Anhui, 232000, China)

ABSTRACT Objective: To study the effect of operation time on knee joint function recovery in patient undergone arthroscopic anterior cruciate ligament (ACL) reconstruction. **Methods:** 65 patients with knee joint ACL injury who were treated in our hospital from January 2016 to August 2017 were selected as the research subjects. All patients were undergone arthroscopic ACL reconstruction. The patients were divided into the study group ($n=35$, the time of injury to the operation ≤ 3 weeks) and the control group ($n=30$, the time of injury to the operation >3 weeks) according to the time of the patient's injury to the operation, and the patients were followed up for 6 months after operation. The knee joint activity, knee joint function and the recovery of ACL were compared between the two groups before operation and 6 months after operation, and the complications during the follow-up period were compared between the two groups. **Results:** Before operation, there was no significant difference in knee joint activity, the international knee documentation committee knee uation form (IKDC) score and the Lysholm knee score between the two groups ($P>0.05$). At 6 months after operation, knee joint activity, IKDC score and Lysholm knee score in the two groups were higher than those before operation, and the study group was higher than the control group, the difference was statistically significant ($P<0.05$). There was no significant difference in the negative rate between the anterior drawer (ADT) test and the Lachman test in the two groups before operation and 6 months after operation ($P>0.05$). But compared with before operation, the negative rates of ADT test and Lachman test in the two groups at 6 months after operation were all increased, the difference was statistically significant ($P<0.05$). Compared with the control group, the complication rate in the study group was significantly lower than that in the control group, the difference was statistically significant ($P<0.05$). **Conclusion:** The patients with knee joint ACL injury who are treated with arthroscopic ACL reconstruction at different times have a better effect. However, if surgery is performed within 3 weeks after injury, the knee joint function recovery of patients is more obvious, and the complication is more lower.

Key words: Anterior cruciate ligament; Reconstruction; Arthroscopy; Operation time; Knee joint function

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作者简介:汤义民(1979-),男,本科,主治医师,从事关节外科方面的研究, E-mail: utbfer@163.com

[△] 通讯作者:陶钧(1976-),男,硕士,副主任医师,硕士生导师,从事关节外科方面的研究, E-mail: kyrepg@163.com

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前言

前交叉韧带 (anterior cruciate ligament, ACL) 位于膝关节内,是胫骨与股骨的重要连接纽带,其主要作用是通过限制胫骨过度前移,以抵抗膝关节发生旋转和外翻,并与膝关节的其他结构共同维持膝关节的稳定性^[12]。ACL 损伤是由于患者膝关节十字韧带断裂而导致膝关节功能受损的一种常见骨科疾病,在运动员和老年人群中发病率较高^[3]。ACL 损伤一般不能自愈,而需通过关节镜下手术重建韧带的方式以恢复膝关节的稳定性,并配以术后康复训练,最终达到恢复膝关节功能的目的^[4,5]。然而,临床上对于患者受伤后多久实施关节镜下 ACL 重建术却存在争议。有研究指出^[6,7],由于膝关节损伤早期易发生急性骨膜炎,此时实施手术关节容易在术后出现粘连,不利于膝关节功能的恢复。同时,也有研究指出^[8,9],虽然在受伤 3 周后再实施手术可以清晰的暴露关节解剖结构,利于手术的展开,但是受伤后关节的不稳性将加速半月板和软骨的退变,不利于膝关节的远期恢复效果。鉴于此,本研究通过分析 ACL 损伤患者在不同时机实施关节镜下 ACL 重建术对患者膝关节功能恢复的影响,以期临床提供数据支持,结果阐述如下。

1 资料与方法

1.1 一般资料

选取 2016 年 1 月至 2017 年 8 月我院收治的膝关节 ACL 损伤患者 65 例为研究对象,纳入标准:(1)所有患者均行核磁共振成像检查显示为膝关节 ACL 损伤,并均由关节镜检查证实;(2)均为单侧膝关节损伤,并完全断裂;(3)所有患者均接受关节镜下 ACL 重建术治疗;(4)患者对本研究知情同意并签署知情同意书。排除标准:(1)有既往同侧韧带手术史者;(2)合并糖尿病、心血管疾病、风湿性疾病以及恶性肿瘤者;(3)伴有同侧长骨损伤者;(4)临床资料不完整者。将所有患者按照受伤至接受手术的时间分为研究组($n=35$,受伤至接受手术的时间 ≤ 3 周)和对照组($n=30$,受伤至接受手术的时间 >3 周),研究组男性 22 例,女性 13 例;年龄 18-65 岁,平均 (41.66 ± 10.52) ;受伤原因:运动伤 18 例,车祸伤 10 例,其他 7 例;受伤部位:左膝关节 19 例,右膝关节 16 例。对照组男性 20 例,女性 10 例;年龄 20-67 岁,平均 (42.04 ± 9.98) ;受伤原因:运动伤 16 例,车祸伤 9 例,其他 5 例;受伤部位:左膝关节 17 例,右膝关节 13 例。两组患者一般资料比较差异无统计学意义($P>0.05$),均衡可比。本研究符合我院伦理委员会的相关规定,并准许实施。

1.2 方法

1.2.1 手术方法 所有患者均行关节镜下 ACL 重建术,手术均由我院副主任医师完成。首先采用罗哌卡因腰麻后行常规关节镜入路进行探查,判断膝关节 ACL 损伤位置及程度,并清理韧带残端和粘连的滑膜组织,对于合并有半月板损伤者则需进行半月板缝合成形术,伴有软骨损伤者则行软骨固定术,手术完成后保留 ACL 残端。在胫骨结节内侧偏内 1 cm 作一个 3 cm 长的切口,剥离出半腱肌薄肌腱,采用可吸收缝线缝合肌腱两端各约 3 cm 处,修整完毕后备用。随后置入胫骨定位器,将其尖端定位于 ACL 残端内侧偏后 2 cm 处,而其三角尖端则置于胫骨结节内侧的骨皮质上,用空心钻在两个止点间钻出一条骨

道,并用吸引器和刨刀将骨道中的碎渣清除,并利用导针将移植韧带经胫骨骨道拉入股骨骨道和关节腔内,股骨端采用可吸收门钉和钛钢板进行固定,胫骨端则采用可吸收的界面螺钉进行固定。完成固定后,膝关节屈曲活动 30 次,关节镜下观察股骨髁间窝与移植韧带间无撞击时,表示膝关节已稳定,随后放置引流管,并逐层缝合伤口,手术完成。

1.2.2 术后康复 术后采用弹力绷带对患肢进行包扎,并使患肢维持在伸直状态。根据所有患者的实际情况,在术后两天之内拔除引流管。术后 1 周内可在床上进行直腿抬高活动,同时结合主动屈膝和踝泵训练,关节屈曲度可控制在 30° 以内;术后 2 周可借助拐杖的支撑下床进行康复训练,并逐渐增大关节屈曲度,至第 4 周关节屈曲度要恢复至 120° 左右。术后 8 周,患者可负重行走,同时使用双拐杖。术后 3 个月,患者可去除拐杖,进行半蹲、慢跑等相关活动。术后 6 个月,患者可逐渐开始体育运动,但应避免剧烈运动,而应根据耐受情况逐步恢复至正常生活。

1.3 观察指标

术后,通过门诊复查以及电话询问的方式分别对两组患者进行随访,时间持续为 6 个月,记录随访结果。(1)膝关节活动度^[10]:使用量角器分别测量两组患者术前和术后 6 个月的膝关节活动度(包括伸膝和屈曲受限角度),同一时间段进行多次测量,结果取平均值。(2)膝关节功能^[11]:于术前和术后 6 个月分别采用国际膝关节文献委员会膝关节评估表(international knee documentation committee knee uation form, IKDC) 和 Lysholm 膝关节评分评估两组患者膝关节功能恢复情况。IKDC 评分包括 18 个问题,分为症状、体育运动和功能三个部分,总分为 0-100 分。Lysholm 膝关节评分有 8 个项目(跛行、支撑、交锁、不稳定、疼痛、肿胀、爬楼梯、下蹲)组成,总分为 0-100 分。以上两个量表评分越高,则说明膝关节功能恢复越好。(3)前抽屉(anterior drawer test, ADT)试验和 Lachman 试验^[12]:于术前和术后 6 个月采用中立位 ADT 试验和 Lachman 试验评估两组患者 ACL 恢复情况。两者均是根据胫骨结节在股骨髁上向前移动的距离进行判定,分为 I-III 度, I 度为移动距离 ≤ 0.5 cm, II 度为移动距离在 0.6-1.0 cm 之间, III 度为移动距离 ≥ 1.0 cm,未移动则为阴性,阴性率 = 阴性例数 / 总例数 $\times 100\%$ 。(4)并发症:记录两组患者随访期间发生疼痛、感染、半月板软骨损伤、膝关节粘连的情况。

1.4 统计学方法

采用 SPSS19.0 进行统计分析,性别比例、并发症发生率、ADT 试验和 Lachman 试验阴性率等计数资料以率(%)表示,进行 χ^2 检验,膝关节活动度、膝关节功能评分等计量资料以均值 $\pm$ 标准差($\bar{x} \pm s$)表示,进行 t 检验,将 $\alpha=0.05$ 作为检验标准。

2 结果

2.1 两组膝关节活动度和功能评分比较

术前,两组膝关节活动度、IKDC 评分和 Lysholm 膝关节评分比较差异无统计学意义($P>0.05$),术后 6 个月,两组膝关节活动度、IKDC 评分和 Lysholm 膝关节评分均较术前升高,且研究组高于对照组,差异有统计学意义($P<0.05$)。见表 1。

表 1 两组膝关节活动度和功能评分比较($\bar{x} \pm s$)Table 1 Comparison of knee joint activity and functional score of two groups($\bar{x} \pm s$)

Groups	n	Knee joint activity($^{\circ}$)		IKDC(score)		Lysholm knee score(score)	
		Before operation	6 months after operation	Before operation	6 months after operation	Before operation	6 months after operation
Study group	35	19.36 $\pm$ 2.39	146.58 $\pm$ 6.88*	18.65 $\pm$ 3.55	79.66 $\pm$ 2.89*	20.98 $\pm$ 3.26	76.28 $\pm$ 4.05*
Control group	30	20.04 $\pm$ 2.15	130.33 $\pm$ 6.29*	18.92 $\pm$ 3.28	60.88 $\pm$ 2.98*	19.99 $\pm$ 3.41	61.99 $\pm$ 4.12*
t		1.197	9.873	0.317	25.746	1.195	14.069
P		0.236	0.000	0.753	0.000	0.237	0.000

Note: compared with before operation, *P<0.05.

2.2 两组 ADT 试验和 Lachman 试验比较

术前与术后 6 个月,两组 ADT 试验和 Lachman 试验阴性率比较差异无统计学意义(P>0.05),但与术前比较,术后 6 个

月两组 ADT 试验和 Lachman 试验阴性率均升高,差异有统计学意义(P<0.05)。见表 2。

表 2 两组 ADT 试验和 Lachman 试验比较[n(%)]

Table 2 Comparison of ADT test and Lachman test between group two[n(%)]

Groups	Time	ADT test				Lachman test			
		Degree I	Degree II	Degree III	Negative	Degree I	Degree II	Degree III	Negative
Study group (n=35)	Before operation	10(28.57)	7(20.00)	4(11.43)	14(40.00)	13(37.15)	6(17.14)	6(17.14)	10(28.57)
	6 months after operation	8(22.86)	2(5.71)	2(5.71)	23(65.72)*	9(25.72)	3(8.57)	3(8.57)	20(57.14)*
Control group(n=30)	Before operation	8(26.66)	5(16.67)	6(20.00)	11(36.67)	11(36.67)	6(20.00)	4(13.33)	9(30.00)
	6 months after operation	6(20.00)	3(10.00)	2(6.67)	19(63.33)*	8(26.67)	2(6.66)	3(10.00)	17(56.67)*

Note: compared with before operation, *P<0.05.

2.3 两组并发症比较

与对照组比较,研究组并发症总发生率降低,差异有统计

学意义(P<0.05)。见表 3。

表 3 两组并发症比较[n(%)]

Table 3 Comparison of complications of two groups[n(%)]

Groups	n	Pain	Infected	Meniscus cartilage injury	Knee joint adhesion	Total incidence
Study group	35	0(0.00)	1(2.86)	0(0.00)	0(0.00)	1(2.86)
Control group	30	1(3.33)	3(10.00)	1(3.33)	1(3.33)	6(20.00)
χ^2						4.928
P						0.026

3 讨论

ACL 损伤通常是由于运动、交通事故等导致,随着社会的发展,人们生活水平不断提高,同时体育运动也日益普及,ACL 损伤的发生率逐年升高,成为人们体育锻炼中的常发疾病,对人们的生活质量造成了严重影响^[13-15]。关节镜下 ACL 重建术是临床治疗 ACL 损伤等运动损伤的首选手术方法,其具有创伤较小、操作精细、患者术后恢复快等优势,已在 ACL 损伤的临床治疗中获得了较好的效果^[16-18]。既往研究报道显示^[19,20],ACL 损伤后膝关节的不稳定性时间的长短与半月板撕裂、软骨损伤等密切相关,因此,关节镜下 ACL 重建术手术时间的选择显得尤为重要。

本研究结果显示,术后 6 个月,两组膝关节活动度、IKDC

评分和 Lysholm 膝关节评分均较术前升高,且研究组高于对照组(P<0.05),提示两种手术时机都有利于患者膝关节活动度和膝关节功能的恢复,但在早期进行手术恢复效果更明显。膝关节僵硬是关节镜下 ACL 重建术后的常见现象,ACL 损伤后,其膝关节处于不稳定状态,早期进行关节镜下 ACL 重建术可以尽早的恢复膝关节的稳定性,减轻或延缓了其继续损伤的可能^[21,22]。同时,早期进行关节镜下 ACL 重建术可以修复损伤了的软骨,尽可能的恢复了软骨的完整性和功能,从而保证了膝关节的稳定性和功能^[23,24]。有研究报道^[25,26],尽早的实施关节镜下 ACL 重建术,可以阻止关节的纤维化,对患者关节功能的恢复具有重要的作用。本研究结果还显示,术前与术后 6 个月,两组 ADT 试验和 Lachman 试验阴性率比较差异无统计学意义(P>0.05),但与术前比较,术后 6 个月,两组 ADT 试验和 Lach-

man 试验阴性率均升高 ($P<0.05$), 提示两种手术时间在 ACL 损伤患者韧带恢复方面具同等的效果。ADT 试验和 Lachman 试验均是检验 ACL 损伤韧带恢复情况的常用方法, 早期实施手术, 可以使 ACL 损伤患者韧带受到的异常应力减少, 避免了其遭到持续的拉扯, 从而降低了其松弛的可能性, 进而增加了膝关节的稳定性和功能的恢复^[27,28]。另外, 本研究中, 与对照组比较, 研究组发生疼痛、感染、半月板软骨损伤、膝关节粘连的并发症发生率明显降低, 差异有统计学意义 ($P<0.05$), 说明早期进行关节镜下 ACL 重建术可以更有效的降低 ACL 损伤患者术后并发症的发生。可能是因为在损伤发生早期, 关节一般都处于急性滑膜炎时期, 此时的关节多伴有水肿和充血, 患者关节易肿胀和疼痛, 并且由于炎症的存在, 发生感染的几率也增大; 同时, 随着手术时间的推移, 膝关节的不稳定性加剧, 伴发半月板和软骨损伤、粘连的可能性也加大, 因此, 受伤早期进行关节镜下 ACL 重建术可以降低相关并发症发生的风险^[29,30]。

综上所述, ACL 损伤患者在早期 (一般为 3 周内) 进行关节镜下 ACL 重建术可以有效恢复患者膝关节活动度和关节功能, 同时可以降低并发症发生的风险。

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