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康复训练联合超激光对全膝关节置换术患者术后疼痛、膝关节功能和生活质量的影响*

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摘要 目的：探讨康复训练联合超激光对全膝关节置换术（TKA）患者术后疼痛、膝关节功能和生活质量的影响。**方法：**选取2016年1月-2017年9月期间在青海省人民医院疼痛科行TKA术式的患者73例为研究对象。根据随机数字表法将患者分为对照组（n=36）和研究组（n=37），对照组患者术后给予康复训练，研究组在对照组基础上联合超激光进行治疗，两组均治疗6周。比较治疗前、治疗6周后（治疗后）两组患者膝关节功能状况、疼痛程度、膝关节屈曲度和伸展度，同时随访3个月，观察两组患者生活质量情况。**结果：**两组患者治疗后视觉模拟疼痛量表（VAS）评分均较治疗前降低，且研究组低于对照组（P<0.05）。两组患者治疗后膝关节伸展度、屈曲度、美国特种外科医院（HSS）评分均较治疗前升高，且研究组高于对照组（P<0.05）。随访3个月，两组患者的生理功能（PF）、生理职能（RF）、躯体疼痛（BP）、总体健康（GH）、活力（VT）、社会功能（SF）、情感职能（RE）以及心理健康（MH）等评分较治疗前均升高，且研究组高于对照组（P<0.05）。**结论：**TKA患者给予康复训练联合超激光治疗效果较好，可显著改善患者膝关节功能，减轻患者疼痛，提高患者生活质量。

关键词：康复训练；超激光；全膝关节置换术；疼痛；膝关节功能；生活质量

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Effect of Rehabilitation Training Combined with Super Laser on Postoperative Pain, Joint Function and Quality of Life in Patients Undergoing Total Knee Arthroplasty*

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ABSTRACT Objective: To explore the effects of rehabilitation training combined with super laser on postoperative pain, joint function and quality of life in patients undergoing total knee arthroplasty (TKA). **Methods:** 73 patients who underwent TKA operation in Pain Department of QingHai provincial people's hospital from January 2016 to september 2017 were selected as the research subjects. The patients were randomly divided into the control group (n=36) and the study group (n=37) according to the digital table method. The control group was given rehabilitation training. The study group intervened with the control group on the basis of the combination of super laser and intervened for 6 weeks. The knee function, pain degree, flexion and extension of joint activity were compared 6 weeks before treatment and 6 weeks after treatment (after treatment). Follow up for 3 months at the same time, the quality of life of the two groups was observed. **Results:** After treatment, the visual analogue scale (VAS) scores of the two groups were lower than those before treatment, and the study group was lower than that of the control group (P<0.05). The knee extension, flexion and American Special Surgery Hospital (HSS) scores of the two groups were higher than those before treatment, and the study group was higher than that of the control group (P<0.05). Follow up for 3 months, the two groups of patients with physiological function (PF), physiological function (RF), somatic pain (BP), overall health (GH), vitality (VT), social function (SF), emotional function (RE) and mental health (MH) were all higher than before treatment, and the study group was higher than the control group (P<0.05). **Conclusion:** Rehabilitation training combined with super laser treatment is effective in TKA patients, which can significantly improve the function of knee joint, relieve pain and improve the quality of life of patients.

Key words: Rehabilitation training; Super laser; Total knee arthroplasty; Pain; Joint function; Quality of life

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前言

全膝关节置换术（Total knee arthroplasty，TKA）是治疗各种原因导致的终末期膝关节骨性关节炎的有效术式，目前该术

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式发展较为成熟且已广泛应用于临床[1-3]。有研究报道显示,全球每年行 TKA 术式患者超过 50 万例,且 15 年内疗效满意率超过 90%[4,5]。TKA 的主要治疗目的是减轻患者疼痛症状、改善膝关节功能、纠正关节畸形等,进而提高患者生活质量[6,7]。近年来,部分行 TKA 术式患者由于术后训练不当,导致膝关节功能恢复效果不佳,更有甚者出现肌肉萎缩、关节挛缩等严重现象[8,9]。目前以激光技术为基础的半导体激光治疗仪在关节外科中应用较为广泛,超激光具有促进人体局部血液循环、提高细胞生物学活性等作用[10]。因此,本研究通过探讨康复训练联合超激光对 TKA 患者术后疼痛、膝关节功能和生活质量的影响,旨在为临床康复治疗提供理论支持,现作如下报道。

1 资料与方法

1.1 一般资料

选取于 2016 年 1 月至 2017 年 9 月间在青海省人民医院疼痛科行 TKA 术式的 73 例患者,纳入标准:(1)所有患者均符合 TKA 手术指征,并且首次行 TKA 术式;(2) 均为单膝患病者;(3)术后 X 光线检查显示假体位置置入理想;(4)膝关节假体均为骨水泥固定型;(5) 患者及其家属均知情,且签署同意书。排除标准:(1)术后并发严重感染、深肢静脉血栓者;(2)伴有认知障碍及精神疾病者;(3)伴有心、肝、肺、肾等功能障碍者;(4)伴有严重骨质疏松、髋踝关节畸形者。根据随机数字表法将患者分为对照组(n=36)和研究组(n=37),其中对照组男 19 例,女 17 例,年龄 35~72 岁,平均(57.25± 4.28)岁;病程 1~6 年,平均(3.26± 0.37)年;受累关节左侧 17 例,右侧 19 例;骨性关节炎 20 例,类风湿性关节炎 16 例。研究组男 21 例,女 16 例,年龄 36~75 岁,平均(58.35± 3.79)岁;病程 2~6 年,平均(3.89± 0.52)年;受累关节左侧 15 例,右侧 22 例;骨性关节炎 23 例,类风湿性关节炎 14 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,本研究已通过我院伦理委员会批准同意。

1.2 方法

两组患者均使用同材料、同厂家生产的膝关节假体,手术由同一组医师完成,术后给予以下干预治疗。对照组患者给予康复训练,具体如下:① 肌力训练 术后 6 h 麻醉作用消失后即可进行踝泵运动,术后 1 d 指导患者进行股四头肌、臀肌等下肢长收缩性训练,根据个人情况增加肌力训练强度。② 关节活动度训练 术后 2 d 拔除引流管进行关节活动度训练,患侧足部向臀部进行弯曲活动,开始训练角度设置为 0°~30°,每天增加屈曲活动度 10°,60~80s 为一个运动周期,1 h/ 次,2 次 /d,1 周后膝关节屈曲度达到 90°。术后 3 d 协助患者行坐位伸屈膝锻炼,维持膝部屈曲 5 s,维持小腿伸直抬高 5 s,15 次 / 组,3 组 /d。③ 部分负重训练 术后 1 周协助患者扶助行器站立,先将重心转移到健侧维持 10 s,随后转移至患侧维持 10 s,同时借助助行器练习平地行走,慢慢增加行走负荷。以上训练均以患者最佳耐受程度为前提。研究组患者在对照组基础上联合超激光进行治疗,术后 3 d 膝关节术口及周围部位给予超激光照射治疗,采用日本东京医研株式会社生产的超激光治疗仪,选取 D 型探头,光波输出功率为 70%,离皮肤约 1 cm 处,照射周期为照射 8 s 停 2 s,治疗时间为 30 min/ 次,一次 /d。两组均给予治疗 6 周。

1.3 观察指标

于治疗前、治疗 6 周后(治疗后)采用美国特种外科医院(Hospital for special surgery,HSS)[11]评分评价患者膝关节功能,HSS 评分包括疼痛、功能、肌力、活动度、稳定性以及有无屈曲畸形,总分为 100 分,分数越高提示膝关节功能越好;采用视觉模拟疼痛量表(Visual analogue scale,VAS)[12]评分评价患者膝关节疼痛程度,VAS 评分根据患者主观疼痛度由轻到重(0~10 分),分值越高表明疼痛程度越剧烈。采用通用的量角器测量膝关节主动屈曲和伸展的关节活动度,测量时患者取俯卧位,主动屈曲、伸展至膝关节的最大范围。通过电话或者门诊复查等方式随访 3 个月,采用 SF-36 健康调查量表[13]评价患者生活质量,SF-36 健康调查量表包括 8 个维度,分别为生理功能(Physiological function,PF)、生理职能(Role-physical,RF)、躯体疼痛(Bodily pain,BP)、总体健康(General health,GH)、活力(Vitality,VT)、社会功能(Social function,SF)、情感职能(Role emotional,RE)以及心理健康(Mental health,MH)。每个维度总分均为 100 分,分数越高说明生活质量越高。

1.4 统计学方法

采用 SPSS20.0 进行统计分析,计数资料以%的形式表示,采用卡方检验,计量资料以($\bar{x}$± s)的形式表示,采用 t 检验。检验标准设置为α=0.05。

2 结果

2.1 两组患者治疗前后疼痛程度比较

两组患者治疗前 VAS 评分比较差异无统计学意义(P>0.05);治疗后两组患者 VAS 评分均较治疗前降低,且研究组低于对照组(P<0.05);详见表 1。

表 1 两组患者治疗前后 VAS 评分比较(分,$\bar{x}$± s)

Table 1 Comparison of VAS scores between the two groups before and after treatment (points, $\bar{x}$± s)

Groups	n	VAS	
		Before treatment	After treatment
Control group	36	7.62± 1.48	5.62± 1.22*
Study group	37	7.29± 1.27	3.75± 1.46*
t	-	1.023	5.930
P	-	0.310	0.000

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

2.2 两组患者治疗前后膝关节功能、膝关节活动度比较

两组患者治疗前膝关节伸展度、屈曲度、HSS 评分比较差异无统计学意义(P>0.05);两组患者治疗后膝关节伸展度、屈曲度、HSS 评分均较治疗前升高，且研究组高于对照组(P<0.05);详见表 2。

表 2 两组患者治疗前后膝关节功能、膝关节活动度比较($\bar{x}\pm s$)

Table 2 Comparison of knee function and knee range of motion between two groups before and after treatment($\bar{x}\pm s$)

Groups	n	Stretch(°)		Buckling(°)		HSS(score)	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Control group	36	-3.97± 0.42	-1.23± 0.17*	65.71± 5.43	101.64± 7.21*	27.76± 5.89	62.24± 7.12*
Study group	37	-3.85± 0.36	-0.91± 0.11*	64.02± 5.67	115.85± 6.79*	28.08± 6.47	84.55± 6.32*
t	-	1.312	9.575	1.300	8.671	0.221	14.168
P	-	0.194	0.000	0.198	0.000	0.826	0.000

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

2.3 两组患者治疗前后生活质量比较

两组患者治疗前 PF、RF、BP、GH、VT、SF、RE 以及 MH 等评分比较差异无统计学意义(P>0.05);与治疗前相比,两组患者治疗后 3 个月的上述评分均升高，且研究组高于对照组(P<0.05);详见表 3。

表 3 两组患者治疗前后 SF-36 健康调查量表比较(分，$\bar{x}\pm s$)

Table 3 Comparison of SF-36 health survey scale between two groups before and after treatment (points, $\bar{x}\pm s$)

Groups	Time	PF	RF	BP	GH	VT	SF	RE	MH
Control group (n=36)	Before treatment	48.68± 10.55	22.56± 6.08	41.31± 7.25	63.73± 10.04	62.06± 10.13	62.56± 8.75	45.27± 8.25	66.15± 11.31
	3 months after treatment	77.61± 10.04*	63.53± 9.15*	68.07± 10.17*	72.69± 11.57*	70.29± 8.64*	73.98± 7.17*	62.23± 8.26*	72.37± 12.52*
Study group (n=37)	Before treatment	49.23± 9.65	21.36± 7.52	42.37± 8.65	63.84± 9.29	61.33± 9.45	63.56± 9.65	46.63± 9.36	65.83± 9.27
	3 months after treatment	89.88± 10.67*#	85.98± 10.47*#	80.33± 11.67*#	83.69± 10.26*#	79.84± 7.19*#	89.17± 10.25*#	78.06± 9.42*#	79.87± 10.18*#

Note: compared with before treatment, *P<0.05; compared with control group, #P<0.05.

3 讨论

TKA 是一种以改善患者膝关节功能、矫正畸形为目的的常用术式,国内外较多学者认为,TKA 的早期康复训练是保证手术效果、促进患者功能恢复的重要保障[14-16]。术后进行适当的康复训练,可减少神经血管损伤、感染、下肢深静脉血栓以及关节不稳等并发症的发生率[17-19]。疼痛往往制约着患者行康复训练的积极性,膝关节术后疼痛产生的主要原因是切口局部无菌性炎症产生组胺、前列腺素等致痛物质,这些致痛物质严重限制了患者的主动、被动活动,影响患者的术后恢复[20-22]。因此,有效缓解 TKA 术后的疼痛反应，可使患者锻炼由被动转化为主动,提高训练积极性。超激光是近年来广泛应用于临床以治疗各种急慢性疼痛,有相关学者研究报道[23],超激光在促进伤口愈合方面作用较为明显。李忠常等人研究亦表明[24],采用超激光照射治疗椎管内麻醉后腰背痛,可明显消除疼痛症状,降低疼痛复发率,同时,超激光照射治疗具有安全性好、可控性高、无侵袭性等特点。因此,本研究通过考察术后疼痛、膝关节功能和生活质量情况,以观察康复训练联合超激光的实用性。

本次研究结果表明,两组患者治疗后膝关节功能均有所改善,疼痛程度减轻,且与单纯采用康复训练干预比较,康复训练联合超激光干预治疗在减轻患者疼痛和改善膝关节功能方面效果更佳。分析其原因,主要有以下几点:(1)超激光是一种直线偏振光近红外线,其波长处于 600~1600 nm 之间,远宽于普通的半导体激光,对人体生物反应综合性较佳;(2)超激光透射深度较普通激光更深，其有效透射人体组织能力可至 5 cm;(3)超激光输出功率为 2200 mw,远远大于普通的激光输出功率 500 mw。通过超激光的光化学、光压强以及热效应等性能,可促使毛细血管扩张,改善局部血液循环状况,促进致痛物质代谢,同时抑制神经兴奋性,最终发挥消炎、抗肿以及消痛的目的[25,26]。患者疼痛减轻,康复训练积极性提高,促进术后膝关节功能恢复。古剑雄等人研究表明[27],超激光疼痛治疗可有效减轻膝关节骨性关节炎患者疼痛,抑制炎症发展,本次研究结果与其基本一致。另外两组患者治疗后膝关节伸展度、屈曲度均较治疗前升高,且研究组高于对照组。同样也可以证实该方案可显著改善患者膝关节活动度,患者疼痛减轻,其功能锻炼的耐受力不断增加,而合理的运动治疗可增强肌力、促进关节的稳定性,加快术后膝关节活动度的恢复速度[28,29]。本研究还发现两组患者治疗后 SF-36 各个维度评分均较治疗前升高,且研究组高于对照组,表明康复训练联合超激光干预治疗可显著改善患者生活质量,这主要是由于研究组方案可以最大限度地减轻

患者疼痛,膝关节功能恢复情况较好,对患者日常生活影响较小,生活质量显著提升[30]。

综上所述,TKA 患者采用康复训练联合超激光干预治疗,可有效减轻疼痛,改善患者的膝关节功能和生活质量,临床应用价值较高。

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