64 - GAIT KINEMATICS CHANGES DURING 90 DAYS AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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INTRODUCTION

The growing interest in the sport has been producing increase in the number of injuries of the knee, especially the anterior cruciate ligament (ACL) (GAIL & CAMANHO, 1997). The ACL injuries is characterized by excessive displacement of the tibia towards earlier, as instability of the mechanism of internal and external rotation and the restriction of the varus and valgus stress in the articulation of knee (KENNEDY, STEWART & WALKER, 1997). Individuals with rupture of ACL reconstruction and have been assessed by measures of anterior dislocation of the tibia with specific orthopedic tests, analysis of the sense of joint position, posture and balance assessments of biomechanical changes in locomotion, as well as isocinetic tests (SOARES, COHEN & ABDALLA, 2002).

The gait is usually the means of locomotion most commonly used because enables analysis of the angular variations, time and space of the joints of ankle, knee, hip and pelvis during the course of this movement. These variables are characterized by providing important information for analyzing in individuals who suffered the ACL or rebuilt. One can thus identify in which joints and how changes in relation to the normal pattern is occurring. However, as the human body is a linkage, any motion amended in one of its shares will affect the overall result of the march. The analysis of all body segments concurrent trajectory of the center body mass would be of great importance for the understanding of possible movement disorders during gait (ANDRADE, 2002).

The study of joint angle allows a clinical application (RAU, DISSELHORST-KLUG &SCHIMIDT, 2000). The analysis of joint angles to determine the specific pattern of motion of each joint evaluated and thus be more specific in the treatment, monitoring the progress of the patient. Moreover, comparison of results is possible when you take these conventions (GAGE, 1991).

In the analysis of the gait there is a set of temporal factors - speed, cadence, stages duration and space - length and width of the step or the last. The percentages of temporal parameters of movement in relation to total duration of the cycle vary with the speed of detachment (ROSENROT, WALL & CHARTERIS, 1980) and with the conditions of instability of moviment (GABELL & NAYAK, 1984) based on that the patients who have compromised the ACL may make changes in the patterns of movement temporo - space before and immediately after surgery and remained more evident in initial post-surgery periods.

Therefore, the purpose of this study was to identify parameters and angular space-time to demonstrate functional adjustments of the joints of the lower limb during the march in different periods of post-ACL reconstruction.

MATERIALS AND METHODS

The experimental group was composed of 04 male volunteers (26.5 ± 3.11 years, 1.71 ± 0.06 m 67.9 ± 10.56 kg) and made the surgery with autograft taken from the tendon of muscles semitendinosus and gracilis, beyond this all had an injury associated with the medial meniscus. The participants were informed and enlightened about the experimental procedure, signing the end of free and informed consent in accordance with Resolution 196/96 on to studies in humans.

To soften the effects of the recovery process due to different protocols employed usual, all subjects underwent the same therapeutic procedure in the first 60 days post-surgery. Thus, divided: 30 days in the initial treatment consisted basically of cryotherapy (20 minutes) at the beginning and the end of eletroanalgesia care and with the TENS unit (10 Channels Neurodyn-Ibramed), (20 minutes).

To avoid the loss of mobility because the healing process, there were calls in the skin to cross the scar - medium-lateral movement and mobilization patellar (cefalo motion-flow and mid-side), both held at a time of 10 minutes. Aiming at increasing the range of motion (ROM) was passive for the quadriceps muscle and isquisotibiais, with the lengthening of the quadriceps during the subject was in prone position with the knee flexed at 90 °, from then physiotherapist led the articulation of the patient sustaining it until the maximum amplitude reached. In the elongation of hamstring the subject was in supine position with the physiotherapist performing flexion of the hip joint with the knee joint extended until the threshold of pain. Were conducted for all movements described four sets lasting 30 seconds in the position of maximum amplitude. Years of passive flexion-extension of the knee joint were also used for gain of ROM, however, in the course of this process have been implemented with the assistance of the swiss ball moves were made in an active manner to the position of 90th, where they were performed 10 repetitions with rest 45 seconds apart.

To continue to strengthen the muscle groups in the chain front and back of the knee joint was increased to squat with knee bending up to 90 degrees where there were two sets of 10 repetitions in the third week and three in the fourth, all for the two weeks the intervals between series was a minute.

In the aspect of improving the proprioceptive system was used to balance the board multidirecional with two rounds with one minute interval. Bicycle ergometric was held in the period of 10 minutes in the first and second week, 15 minutes in the third and 20 minutes in the last week aimed at increasing the breadth articulate in an active manner, with adjustment of the seat to allow full extent of the knee to stretch the maximum pedaling.

Data kinematic joints of the hip, knee and ankle, were obtained bilaterally in all patients. The markers were placed on anatomical structures based on literature (KENDALL, McCREARY & PROVANCE, 1995; NETTER, 2000; DANGELO & FATTINI, 2000), points in the shoulder, hip, knee, ankle, heel and tiptoe. Since the angular variables selected for the study were: the hip angle (measured between the segments trunk and thigh), knee (between the thigh and leg) and ankle (between the leg and foot), as well as to examine the variables time were selected the time of double support, the support simply by step, the balance sheet, the last (cycle) and length of the step and the last.

Individuals were collected in three separate periods, with 30, 60 and 90 days after reconstruction of the ACL. In all samples, individuals were instructed to use of swimwear to facilitate the fixing of reflective markers on a spherical with a diameter of 2.5 cm, which were fixed on anatomical points of interest with a double-sided tape, after the location the structures previously selected and marked with special pencil.

Items marked for analysis in the sagittal plane were located well: Shoulder: located 5 cm distal of the acromion (tip of shoulder, side); Hip: tuberosity of the greater trochanter, located on the edge of the proximal femur in line with the hip joint , On the side of the thigh; Knee: lateral condyle of the tibia, located on the edge of the proximal tibia according to join the femur; Ankle: lateral malleolus, the most prominent located on the distal end of the fibula in its docking with the ankle; Calcaneus: projection back of the calcaneus aligned with the marking of tiptoe; tiptoe: projection top of the head of the fifth metatarsal.

The description of the results atou to the behavior of the operated limb (MO) and member of the non-operated (MNO) in the three cases of collection (30, 60 and 90 days after reconstruction of the ACL). The normality of the data was obtained through a Shapiro-Wilk test. The statistical analysis was so descriptive using mean and standard deviation during the movement of the joints of hip, knee and ankle and the space-time variables. In the comparison between periods collected (30, 60 and 90 days after the ACL reconstruction) to the MO and MNO was used analysis of variance *Anova one-way*, as well as to measure the significance was used a test of post-hoc *Scheffé*. But to compare the MO with the MNO in the same period of collection (30, 60 and 90 days after the ACL reconstruction) was used a *T test Student* for independent samples, for all the analysis was considered the level of significance 0.05. Being processed in the same package operating the program SPSS for Windows, version 12.0. (SPSS Inc., Chicago, IL).

RESULTS

The angular variations analysis shows that no significant differences were observed in three stages (30, 60 and 90 days) between the various stages of the cycle of motion (0, 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100%) to the joints of hip, knee and ankle, as can be seen in Table 1.

The same happened when comparing the variables space for the length of the last (CP), length of the step of the operated member (CPMO) and length of the step of the non-operated member (CPMNO), according to table 2.

However, when considering the variables time, the period of between 60 and 90 days, specifically in the accounts of non-operated member (BMNO) and simple support of the operated member (ASMO) can be observed significant differences, thus the time of the last (TP) of individuals, the same was not observed when compared to periods between 30 and 60 days, table 3.

Table 1 - kinematic parameters (mean and SD) for the articulation of the hip, knee and ankle in the operated limb (MO) and non-operated (MNO) in different percentages of the cycle of movement for all three periods analyzed (n = 4).

Period (days)		% Cycle										
	Hip	**0**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
30	MO	19,10 (5,43)	13,70 (7,96)	7,63 (8,93)	3,53 (7,87)	-1,88 (7,34)	-8,19 (5,68)	-4,89 (4,37)	10,58 (5,60)	21,65 (5,32)	22,96 (5,25)	19,52 (7,51)
30	MNO	21,80 (8,51)	14,9 (9,98)	9,45 (8,33)	5,79 (6,22)	1,14 (5,16)	-4,05 (3,36)	-3,10 (4,98)	9,48 (6,10)	21,15 (5,83)	23,20 (5,39)	21,24 (7,53)
60	MO	18,48 (5,51)	11,41 (4,77)	6,57 (6,76)	4,12 (6,33)	-0,66 (5,80)	-6,51 (4,10)	-3,49 (3,28)	11,78 (4,83)	21,55 (4,94)	21,22 (3,13)	18,98 (5,23)
60	MNO	18,53 (4,50)	11,84 5,61	5,43 (4,98)	1,71 (5,27)	-2,05 (5,19)	-7,17 (4,29)	-5,28 (4,06)	8,59 (4,09)	18,89 (3,66)	19,26 (4,13)	16,77 (4,02)
90	MO	19,99 (6,48)	16,40 (6,95)	10,36 (6,35)	4,13 (5,94)	-1,93 (5,97)	-6,52 (3,65)	-0,65 (2,09)	14,26 (3,00)	23,91 (3,14)	23,37 (3,60)	20,55 (5,12)
90	MNO	18,06 (6,74)	13,85 (8,90)	7,44 (8,13)	2,54 (7,05)	-2,28 (6,54)	-7,18 (5,47)	-3,41 (5,14)	10,70 (5,29)	20,32 (4,73)	19,84 (5,23)	18,11 (6,83)
	Knee											
30	MO	6,94 (3,33)	15,43 (3,51)	13,63 (3,44)	10,07 (4,49)	8,40 (7,18)	14,26 (5,49)	37,62 (4,26)	62,36 (5,94)	49,99 (5,39)	17,07 (1,80)	7,63 (7,11)
30	MNO	9,57 (3,98)	16,82 (6,28)	14,47 (6,16)	9,89 (5,11)	8,79 (4,68)	15,35 (5,31)	37,00 (7,78)	60,67 (4,65)	50,03 (3,91)	16,18 (4,82)	9,29 (2,44)
60	MO	8,47 (5,95)	12,63 (6,65)	10,40 (5,91)	7,21 (4,06)	6,61 (4,22)	12,58 (3,61)	36,62 (6,46)	62,10 (8,71)	48,65 (9,44)	13,27 (5,15)	8,07 (4,03)
60	MNO	7,93 (2,22)	14,19 (3,35)	10,17 (3,58)	5,54 (5,26)	5,70 (5,41)	12,67 (6,92)	35,23 (11,30)	59,33 (7,77)	47,08 (5,51)	11,68 (7,24)	7,91 (3,18)
90	MO	8,48 (2,70)	18,52 (2,21)	16,54 (2,77)	10,37 (1,56)	8,61 (3,55)	17,00 (3,53)	43,47 (3,89)	64,13 (2,76)	48,60 (4,66)	13,97 (3,12)	7,75 (1,29)
90	MNO	8,61 (4,64)	18,32 (1,43)	14,23 (2,12)	8,49 (2,51)	7,91 (2,92)	15,23 (5,72)	38,69 (9,47)	61,63 (7,49)	49,59 (7,17)	14,40 (7,66)	7,64 (1,19)
	Ankle											
30	MO	-10,74 (2,63)	-10,80 (3,06)	-4,06 (3,85)	0,08 (3,52)	2,11 (4,88)	0,20 (6,14)	-14,88 (7,74)	-13,15 (6,73)	-3,32 (2,71)	-3,73 (4,97)	-9,19 (2,92)
30	MNO	-7,14 (5,12)	-11,27 (4,13)	-5,66 (4,63)	-3,37 (5,76)	-1,09 (7,32)	-1,91 (7,65)	-17,47 (6,15)	-18,98 (6,88)	-5,03 (2,91)	-4,29 (6,06)	-8,41 (5,45)
60	MO	-9,83 (2,90)	-14,06 (7,25)	-8,20 (7,03)	-4,45 (6,02)	0,08 (5,66)	-3,08 (4,44)	-16,80 (4,81)	-16,64 (6,92)	-5,22 (2,49)	-7,35 (3,87)	-9,14 (3,88)
60	MNO	-12,93 (3,70)	-13,69 (2,40)	-8,41 (1,04)	-6,66 (2,63)	-3,36 (3,37)	-6,12 (6,03)	-19,45 (8,73)	-16,65 (4,89)	-5,03 (7,56)	-8,55 (2,60)	-10,29 (2,76)
90	MO	-10,89 (1,71)	-12,58 (3,54)	-5,87 (4,61)	-2,71 (3,38)	-0,21 (0,98)	-5,07 (1,91)	-15,71 (5,81)	-11,09 (5,54)	-6,82 (4,12)	-8,70 (6,18)	-11,82 (2,19)
90	MNO	-8,95 (3,89)	-9,69 (5,26)	-3,99 (7,00)	-0,51 (7,43)	3,01 (4,72)	-0,51 (3,84)	-14,89 (2,89)	-12,21 (3,71)	-4,67 (2,28)	-6,66 (2,80)	-10,32 (3,31)

Note: All figures are expressed in degrees

Table 2 - Values of average, standard deviation for the variables space: length of the last (CP), length of the step of the operated limb (CPMO) and length of the last member of the non-operated (CPMNO).

Period (days)	Variables		
	CP	**CPMO**	**CPMNO**
30	70,71 (5,57)	35,55 (3,79)	35,16 (2,87)
60	73,78 (8,07)	38,19 (3,90)	36,86 (4,41)
90	74,18 (6,46)	37,36 (3,88)	36,83 (2,99)

Table 3 - Values of average, standard deviation and (coefficient of variation) for time variables: time to support double in the first and second time (TAD1 and TAD2), balance and simple support of the operated and non-operated member (BMO, BMNO, ASMO and ASMNO) and the last time during the three periods examined (n = 4).

		Variables						
		TAD1	TAD2	BMO	BMNO	ASMO	ASMNO	TP
Period (days)	30	0,17 ÿ 0,02 (14,46)	0,17 ÿ 0,03 (14,29)	0,42 ÿ 0,03 (35,37)	0,43 ÿ 0,02 (35,71)	0,43 ÿ 0,02 (35,71)	0,42 ÿ 0,03 (35,54)	1,20 ÿ 0,06 (100,00)
	60	0,17 ÿ 0,04 (14,19)	0,18 ÿ 0,04 (14,53)	0,44 ÿ 0,04 (35,30)	0,44 ÿ 0,02 (35,98)	0,44 ÿ 0,02 (35,98)	0,44 ÿ 0,04 (35,30)	1,23 ÿ 0,10 (100,00)
	90	0,17 ÿ 0,03 (15,37)	0,14 ÿ 0,03 (12,78)	0,41 ÿ 0,02 (36,48)	0,40 ÿ 0,03* (35,37)	0,40 ÿ 0,03* (35,37)	0,41 ÿ 0,02 (36,48)	1,13 ÿ 0,06* (100,00)

DISCUSSION

The patients with ACL injury prior to undergo the surgery usually develop compensatory mechanisms in their activities of daily living, where the march is included. The hypothesis is that these mechanisms are caused by a subconscious learning and neuromuscular adaptations. Consequently, the proprioceptive response can not be physiological rather disorganized, as a result, patients feel insecure because the knee is the interpretation and analysis of cortical position of the knee are disturbed (BARRETT, 1991; JEROSH & PRYMKA, 1996). The development of these mechanisms is beneficial for subjects with injury or reconstruction of the ACL decreases because the anterior tibial displacement (DTA) caused by injury (BERCHUCK et al, 1990). This is due, the perception of the changes and limitations on their activities of daily living (CARBON & JOHNSON, 1993). Despite the muscles are joint guardians side, the role of the ACL in the tibial anterior stabilization can not be efficiently replaced by the muscles. Studies showed that the anterior dislocation can be seen in single support, since the absence of the ligament causes abnormal movement in the tibial anterior motion (BONNIN, 1980; DEJOUR, NEYRET & BONNIN, 1991). Thus, they are observed reductions in the frequency, the length of time, decrease in the phase of support, increasing the extent of the reduction in hip and knee extensor torque. Lewek et al, (2002) studied subjects with ACL deficient and after surgery for reconstruction, they showed a decrease in the time and angle of the knee during walking.

In this study, it can be seen in Table 1, from 10% to 100% of the gait cycle there was no significant variation of the angular position of the joints of hip, knee and ankle in the period, 30, 60 and 90 days after the ACL reconstruction, the same trend suggested by this study is also observed by Knoll et al.(2004) who accompanied patients with ACL injury since before the surgery to twelve months postoperatively. In relation to patients before surgery found no difference between the patterns of movement compared to individuals without ACL injuries. The two studies mentioned compared with the work Devita et al. (1997) who sought to identify the initial effects of ACL injury and surgery to reconstruct the ligament evaluating the joint kinematics, kinetics and energy during the march. Before performing the surgery, patients with ACL injury had greater flexion of the knee in the second half of the stage of support. They also found a prolonged extensor torque two weeks after the injury and for this they indicated that the process of adapting the disability of the ACL is prolonged, requiring more time for learning of the adjustments. Thus, there is doubt on whether the individuals with disabilities in this ligament using compensation or not during the march. The changes in the patterns of motion may appear or be marked after surgery.

However, factors like varying the time may influence the behavior of the march of the individual post-ACL reconstruction. Table 4, for example, changes in the time period of 60 days and 90 showed statistical difference in the BMO and thus ASMO in TP, this occurred because of the tendency of patients to prevent the contraction of the quadriceps injury in the ACL when the knee is flexed and is consistent with the study of Arms et al. (1984). Rudolph et al. (1998) also studied the march, among other activities of two groups of individuals with total rupture of the ACL: one that had undermined the activities of daily living (no-coper) and another that had no restrictions on activities that held pre-lesion (coper). Both groups decreased the strength of entry into contact with the ground and the group with instability still showed little knee bending now.

Shelburne et al. (2005) used a mathematical model to predict the amount of force that the quadriceps and hamstring muscles need to restore stability to the knee with ACL deficient during the gait. They concluded that the increase hamstring the strength of muscles was enough to stabilize the knee ligament with this weak during the gait, and that did not occur with decreasing the force of the femoral quadriceps muscle, this was insufficient to restore the anterior tibial translation and in the knees who had the ligament intact.

The other variables space - CP, CPMNO and CPMO - were described by Roberts et al.(1998) showed no significant difference, this assertion found in this study.

Devita et al.(1997) to assess the subjects after three and five weeks of surgery to reconstruct the ACL, the length of the step decreases with three weeks postoperatively and normalizes after five weeks. The timing of support does not alter with three or five-week post-operatively. They stressed in their conclusions that there is a significant change in the position of hip and knee, the positive work done in the hip and the angular momentum of the hip extensor in patients with three and five weeks of surgery to reconstruct the ligament when compared to healthy subjects.

In comparison between this study that even with three months of surgery showed differences in the variables of time and work Knoll et al. (2004) patients operated recovered the parameters space-time and changes in angles of the knee after four months of surgery.

CONCLUSION

It should be emphasized among the results of this study that the time between periods of 60 and 90 days for the joints described above, specifically in the accounts of member non-operated and simple in support of the operated limb can be observed significant differences, influencing so the last time the subjects, interpreted as a change adopted by individuals with the injury, to reduce the contraction of the quadriceps (quadriceps avoidance or zero) in order to avoid the forward tibia on the femur.

Thus individuals in the postoperative period of reconstruction of the ACL showed no differences in the periods analyzed for the angular motion of the lower MO when compared with the MNO in the three distinct periods in the joints analyzed, these differences can not have been visible due to adaptations of the locomotor system which involves a different gait of the normal pattern.

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GAIT KINEMATICS CHANGES DURING 90 DAYS AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

ABSTRACT

The injury of anterior cruciate ligament (ACL) promotes instability to articulate generating biomechanic alterations in the gait standard. The objective of this study was the identification of the angular and space-temporal parameters of the joints of the lower member during the gait in different periods after-reconstruction of the ACL. Four volunteers of the masculine sex had participated of the study, being collected in the periods of 30, 60 and 90 days after-reconstruction of the ligament, the images had been acquired by a digital camera SONY®, being processed in Peak Performance software. The results had shown that didn't have differences where comparison of the member operated (MO) with the member not operated (MNO) in the angular variable for the three analyzed periods, however in the temporal variable between the period of 60 and 90 days, in the swing of the member not operated (BMNO) and simple support of the operated member (ASMO) had been evidenced differences thus influencing the time of the passed one (TP). Finally, for the space variable significant differences in the periods analyzed in the length of the passed one had not been found (CP), length of the step of the operated member (CPMO) and length of the step of the member not operated (CPMNO). It is presumed that a trend of the patients exists to reduce the contraction of quadríceps, for subconscious adaptations during the floor, in order to prevent the prior of the shinbone in relation to thingborn, being that these still are not inside of a standard considered normal for the march.

Key-words: biomechanics, anterior cruciate ligament, gait.

CINEMATE AMENDEMENTS DE MARS EN 90 JOURS APRÈS- RECONSTRUCTION LE LIGAMENT CROISÉ ANTÉRIEUR (LCA)

RÉSUMÉ

La lésion du ligament croisé antérieur (LCA) favorise l'instabilité articuler génératrices de biomécanique des changements dans la façon standard. Le but de cette étude était d'identifier les paramètres et angulaire espace-temps des articulations du membre inférieur au cours de l'mars à différentes périodes de post-ACL reconstruction. L'étude a été basée sur quatre volontaires étaient de sexe masculin, ont été recueillies au cours des périodes de 30, 60 et 90 jours post-ACL reconstruction, les images ont été acquises par un appareil photo numérique Sony ®, en cours de traitement dans le logiciel Peak Performance. Les résultats ont montré que dans la comparaison des exploités membre (MO) avec le député non-exploités (MNO) à angle variable n'y a pas de différence entre les trois périodes examinées, mais variables au cours de la période de temps entre 60 et 90 jours dans le stock d'État non-exploités (BMNO) et le simple appui du membre opéré (ASMO) ont été trouvé ainsi le temps de la dernière (TP). Enfin, dans l'espace des variables n'a pas été constaté d'importantes différences dans la durée des périodes examinées dans le passé (PC), la longueur de l'étape de la branche exploité (CPMO) et la durée de l'étape membre de la non-exploités (CPMNO). On suppose qu'il existe une tendance pour les patients à réduire la contraction du quadriceps, par le subconscient des ajustements au cours de la parole pour éviter de transmettre le tibia sur le fémur, et ils ne sont pas encore à un niveau considéré comme normal de mars .

Mots clés: biomécanique, ligament croisé antérieur, mars.

CINEMATE CAMBIOS EN MARZO EN 90 DÍAS POSTERIORES A LA RECONTRUÇÃO EL LIGAMENTO CRUZADO ANTERIOR (LCA)

RESUMEN

La lesión del ligamento cruzado anterior (LCA) promueve la inestabilidad biomecánica articular la generación de cambios en la forma estándar. El objetivo de este estudio fue determinar los parámetros y angular espacio-tiempo de las articulaciones de las extremidades inferiores durante la marcha en diferentes períodos de post-ACL reconstrucción. El estudio se basa en cuatro voluntarios eran hombres, fueron recogidos durante los períodos de 30, 60 y 90 días después de la reconstrucción ACL, las imágenes fueron adquiridas por una cámara digital Sony ®, siendo tratados en el software de máximo rendimiento. Los resultados mostraron que en comparación de la extremidad operada (MO) con el miembro no operado (MNO), en ángulo variable no hay diferencia entre los tres períodos examinados, pero variables en el período de tiempo comprendido entre 60 y 90 días en el almacén de Estado no funciona (BMNO) y simple apoyo de los operados (ASMO) se han encontrado por lo tanto, el tiempo de la última (TP). Por último, en el espacio de las variables no se encontraron diferencias significativas en la duración de los períodos examinados en el pasado (PC), la duración del paso de la extremidad operada (CPMO) y la longitud del paso de la no operada (CPMNO). Se supone que hay una tendencia de los pacientes a reducir la contracción del cuadriceps, por el subconsciente ajustes en el piso para evitar que se transmita la tibia sobre el fémur, y que aún no están en un nivel considerado normal para la marcha.

Palabras clave: biomecánica, ligamento cruzado anterior, marcha.

ALTERAÇÕES CINEMÁTICAS NA MARCHA NOS 90 DIAS PÓS-RECONTRUÇÃO DO LIGAMENTO CRUZADO ANTERIOR (LCA)

RESUMO

A lesão do ligamento cruzado anterior (LCA) promove instabilidade articular gerando alterações biomecânicas no padrão marcha. O objetivo deste estudo foi a identificação dos parâmetros angulares e espaço-temporais das articulações do membro inferior durante a marcha em diferentes períodos pós-reconstrução do LCA. Participaram do estudo quatro voluntários do sexo masculino, sendo coletados nos períodos de 30, 60 e 90 dias pós-reconstrução do LCA, as imagens foram adquiridas por uma câmera digital *SONY*®, sendo processadas no software *Peak Performance*®. Os resultados mostraram que, na comparação do membro operado (MO) com o membro não operado (MNO) nas variáveis angulares não houve diferenças entre os três períodos analisados, porém nas variáveis temporais entre o período de 60 e 90 dias, no balanço do membro não operado (BMNO) e apoio simples do membro operado (ASMO) foram constatadas diferenças influenciando assim o tempo da passada (TP). Por fim, para as variáveis espaciais não foram encontradas diferenças significativas nos períodos analisados no comprimento da passada (CP), comprimento do passo do membro operado (CPMO) e comprimento do passo do membro não operado (CPMNO). Presume-se que existe uma tendência dos pacientes reduzirem a contração do quadríceps, por adaptações subconscientes durante o andar, a fim de evitar a anteriorização da tíbia em relação ao fêmur, sendo que estas ainda não estão dentro de um padrão considerado normal para a marcha.

Palavras-chave: biomecânica, ligamento cruzado anterior, marcha.